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ABSTRACT

This package contains two types of asbestos training materials: (1) an instructor's guide for "Asbestos in the Home: A Homeowner's Course"; and (2) "Asbestos Abatement Certification: Small-Scale Worker Student Manual," a 16-hour course, with instructor's guide. The instructor's guide for the 6-hour homeowner's course contains eight sections that cover the following topics: introduction; characteristics of asbestos and the health effects; types of asbestos building materials and their locations in the home; maintenance and removal of asbestos materials; state and federal asbestos laws; working with asbestos abatement contractors; a list of 74 resource people and companies; and a list of 71 instructional resources and publications. Suggestions for class formats, topic outlines, and a glossary are included. The student manual contains nine sections of which the first six are: course introduction; physical characteristics of asbestos; health effects of asbestos exposure; state and federal asbestos laws; personal protection equipment and respiratory protection; and state-of-the-art work practices. The last three sections concern hands-on activities focusing respectively on: (1) employee protection; (2) glovebag techniques; and (3) minienclosures. Student units include objectives, outlines, information sheets, and, in some cases, review questions and learning activities. Many legal and regulatory materials are included. The student guide also contains a glossary. The accompanying instructor's guide provides information on course outlines, practice quizzes, presentation outlines, instructional resources, state and federal regulations, course accreditation, and professional contacts. (KC)

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ASBESTOS TRAINING CURRICULUM PROJECT

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Albany, OR

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Asbestos in the Home

A Homeowner's Course

Prepared by: Ron Sharman, Linn-Benton Community College, Albany, OR and the Oregon State Department of Education

Asbestos in the Home

Draft Copy Notes:

This is a draft copy of a training program designed to accompany at least 6 hours of classroom time for home and building owners. Materials in this manual were pulled from various EPA publications covering asbestos and asbestos abatement projects.

Asbestos in the Home

Linn-Benton Community College and the Oregon State Department of Education make no representation, warranty or guarantee in connection with the materials in this course notebook or oral presentations made in connection with these materials. These organizations listed above hereby disclaims any liability or responsibility of for loss or damage resulting from their use and for any violation of federal, state or municipal regulation, ordinance or law resulting directly or indirectly from their use.

Asbestos in the Home

Contents:

Introduction and Notes to the Instructor

Section I:	Course Introduction
Section 2:	Characteristics of Asbestos and the Health Effects
Section 3:	Types of Asbestos Building Materials and Their Locations in the Home
Section 4:	Maintenance and Removal of Asbestos Materials
Section 5:	State and Federal Asbestos Laws
Section 6:	Working With Asbestos Abatement Contractors
Section 7:	Resource People
Section 8:	Instructional Resources and Publications
Appendix:	Asbestos Glossary

Asbestos in the Home

A Homeowner's Course

Introduction:

The outlines and other materials compiled here are designed to be a guide for the production of a six-hour course dealing with asbestos in the home. The information contained in this guide is a collection of materials that are available from various public and private sources. It should be noted that the training materials, publications, and laws contained in this guide were compiled during the summer of 1988. Since accepted asbestos abatement techniques and state and federal laws are subject to revision on a continuous basis, these materials should be updated for each use.

The Student Materials:

The publication "Asbestos in the Home: A Homeowner's Guide" is recommended as a text for this course. It is available for the EPA Region X office in Seattle or from your local Oregon State Extension Service Energy Program.

Other possible materials are listed in Section 8 of this manual, "Instructional Resources and Publications". Current copies of The State of Oregon regulations covering the removal and disposal of asbestos are available from the Accident Prevention Division and the Department of Environmental Quality.

Session Outline

Asbestos in the Home

Class Format:

The proposed six-hour training is divided into three sessions, two hours in length. Topics and section to be covered during each session are given below. It is recommended that you make use of local and state expertise. For example, covering laws and regulations concerning the removal of asbestos may be best accomplished by a representative of the Air Quality Section of the Department of Environmental Quality. Contacts in the DEQ are listed in Section 7.

Proposed Topic Outline:

Session I:

Section 1: Course Instroduction
Section 2: Characteristics of Asbestos and the Health Effects

Session II:

Section 3: Types of Asbestos Materials and Their Locations
Section 4: Maintenance and Removal of Asbestos Materials

Session III:

Section 5: State and Federal Asbestos Laws
Section 6: Working With Asbestos Contractors

Section 1: Course Introduction Outline

1. Federal Regulatory Agencies
    - Department of Labor
        - OSHA
        - NIOSH
    - Environmental Protection Agency
        - NESHAPS
        - Worker Protection Rule
        - AHERA
    - Other Federal Agencies
        - Department Of Transportation (DOT)
        - National Bureau of Standards
        - Consumer Product Safety Commission
2. State of Oregon regulatory agencies
    - Department of Environmental Quality
    - Accident Prevention Division
3. Local or regional air pollution control authority

4. Accredited Workers/ Levels of Asbestos Abatement

   Asbestos Awareness Training

   Worker for Small-Scale Asbestos Abatement

   Worker for Full-Scale Asbestos Abatement

   Supervisors for Full-Scale Asbestos Abatement

5. State of the Art Asbestos Abatement Work Practices

   Worker Protection
      - Respiratory
      - Protective clothing

   Clean up activities

   Glove-bags

   Mini-enclosure

   Full scale abatement

   Air monitoring

   Waste disposal

Section 2: Characteristics of Asbestos and the Health Effects

1. Mineralogy of Asbestos

   Crystal structure

   Mining and manufacture of asbestos products

   Definition of asbestos fibers

2. Types of Asbestos

   Chrysotile

   Crocidolite

   Amosite

   Others

3. Aerodynamic characteristics of asbestos fibers

   Friable vs. non-friable asbestos material

   Time for asbestos fibers to settle

   Action level of airborne fibers

   Permissible Exposure Limit for airborne fibers

4. Commercially useful characteristics of asbestos

   Strong, flexible, fireproof, lightweight, chemically inert

5. Diseases associated With asbestos: breathing asbestos fibers

   Asbestosis

   Mesothelioma

   Lung Cancer

   Other Cancers

6. Recommended asbestos exposure limits

   Permissible Exposure Limit (PEL)

   Action Level for asbestos fibers

   Is there a safe level for asbestos fiber exposure?

Section 3: Types of Asbestos Building Materials and Their Locations in the Home

1. Exterior Surfaces

   Deck undersheeting

   Cement asbestos board siding and undersheeting

   Roof felt and shingles

   Window putty

2. Automobile Related Materials

   Brake linings, clutch facings, and gaskets

3. Insulation

   Loose blown-in fill insulation

   Batt insulation

4. Flooring

   Vinyl asbestos sheets, tiles, and undersheeting

5. Boilers, Heaters, and Piping

   Heat source covering

   Air duct lining

   Door and cover gaskets

   Pipe lagging

   Wall gaskets and lining

6. Interior Surfaces

   Sprayed-on acoustic ceilings

   Acoustical tile

   Textured paint

   Heat reflectors (woodstoves)

7. Electrical Equipment

   Lamp sockets

   Outlet and switchboxes

   Insulation on knob and tube wiring

   Recessed lighting

   Main panel and fuse boxes

8. Built-in Equipment

   Water heaters

   Range hoods

   Clothes driers

   Dishwashers

9. Appliances

   Refrigerators

   Freezers

   Portable dishwashers

   Toasters

   Slow-cookers

   Ovens

9. Appliances (continued)
    - Hair dryers
    - Portable heaters

10. Miscellaneous
    - Cat box aggregate (sand or clay)
    - Fireplace logs
    - Asbestos hot pads
    - Asbestos gloves

Section 4: Maintenance & Removal of Asbestos Materials

1. Cleaning procedures for asbestos contaminated areas
   - Isolation of contaminated area
   - Wet methods: Amended water
   - HEPA vacuuming
2. Control of ACBM: response actions
   - Repair
   - Encapsulate
   - Enclosure
   - Removal
3. State of the Art Asbestos Abatement Work Practices
   - Qualified and Certified workers
   - Worker Protection
     - Respiratory
     - Protective clothing
   - Clean up activities
   - Glove-bags
   - Mini-enclosure
   - Full scale abatement
   - Air monitoring
   - Waste disposal

4. Prohibited Maintenance Activities

- Do not drill holes in ACM
- Do not hang plants or pictures on ACM surfaced material
- Do not sand ACM floor tile
- Do not damage ACM while moving furniture and other materials
- Do not install curtains, etc. in a way that could damage ACM
- Do not dust floors, ceilings, moldings in asbestos-containing environments with a dry brush or broom
- Do not use an ordinary vacuum to clean up asbestos-containing debris
- Do not remove ceiling tiles below ACM without proper respiratory protection, isolation of the work area, and observing proper disposal procedures
- Do not remove ventilation system filters dry
- Do not shake ventilation system filters

Section 5: State and Federal Asbestos Laws

1. Federal Regulatory Agencies

   Department of Labor

   - OSHA
   - NIOSH

   Environmental Protection Agency

   - NESHAPS
   - Worker Protection Rule
   - AHERA

   Other Federal Agencies

   - Department Of Transportation (DOT)
   - National Bureau of Standards
   - Consumer Product Safety Commission

2. State of Oregon regulatory agencies

   Department of Environmental Quality

   OAR 340-25: Hazardous Air Contaminant Rules for Asbestos

   OAR 340-33: Licensing and Certification

   Accident Prevention Division

   OAR 437-83: Construction Standards for Asbestos

   OAR 437-129: Protective Equipment, Apparel, and Respirators

   OAR 437-153: Pipe Labelling

3. Local or regional air pollution control authority

Section 6: Working With Asbestos Abatement Contractors

1. Evaluating Asbestos Abatement Contractors

   Indentify the responsible contractor

2. Contractor Qualification Documentation

   State contractor license

   Asbestos abatement certification

   Personal and professional references

   Certificates of liability insurance

3. Additional Documentation

   Written operating procedure and respiratory protection policy

   Training records for foreman and crew

   Previous job air monitoring data

4. Working With an Abatement Contractor

   Notification of DEQ and local Air Quality Commision prior to work

   Return signed copy of contract/proposal before job starts

   No one should be in the house during the abatement project

   Obtain temporary EPA waste generator number

5. Releasing the Contractor

Hire an independent monitor: Industrial Hygienist

Determine clearance limit for job completion

"Aggressive" clearance air samples

Keep work area isolated untill clearance

Air samples should have a binding "chain of custody"

Discussions with the analytical lab

Asbestos in the Home

Section 7: Resource People

EPA Regional Contacts:

EPA Region 10 1200 6th Avenue Seattle, WA 98101 (206) 442-2870	Walt Jaspers - (206) 442-2632 (asbestos in schools) Jerry Chastein - materials (206) 442-8282

Oregon - AHERA State Designated Contact:

Al Shannon
Oregon Department of Education
700 Pringle Parkway, S.E.
Salem, OR 97310
(503)378-6964

Oregon Department of Environmental Quality:

Wendy L. Sims
Asbestos Control Supervisor
Air Quality Division
Program Operations Section
Department of Environmental Quality
811 SW 6th Avenue
Portland,OR 97204

(503) 229-6414 or Dave Waals; Matt McClincy 229-5517
(800) 452-4011

Oregon Department of Insurance and Finance Accident Prevention Division:

Central Office:

Accident Prevention Division
Labor & Industries Building, Room 204
Salem, OR 97310
(503) 378-3272

Regional Offices:

Region 1 - Portland West
1830 SW Kerr Parkway, Suite 100
Lake Oswego, OR 97305
229-5910

Region 2 - Portland East
1245 SE 122nd Ave., 2nd floor
Portland, OR 97233
257-4302

Region 3 - Salem
3867 Wolverine St. NE, Suite 26
Salem, OR 97305
378-3274

Region 4 - Eugene
2677 Willakenzie, Suite 6
Eugene, OR 97401
686-7562

Region 5 - Bend
2150 NE Studio Rd.
Bend, OR 97701
388-6066

Region 6 - Medford
625 Franquette, Suite B
Medford, OR 97501
776-6030

Oregon State University Extension Service: Energy Program

Field Staff:

Northwest Oregon Area
David Brook, Energy Agent
Ted Haskell, Energy Agent
OSU Extension Service
3821 SW Canyon Road (TERA One)
Portland, OR 97221
241-9172

Eastern Oregon Area
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OSU Extension Service
Office: Agricultural Service Center
Island City, OR
Mailing Address: Rt. 1 Box 1705
La Grande, OR 97850
963-1010

Central Oregon Area
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1128 NW Harriman
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388-6436

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754-3004

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754-3311

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Corvallis, OR 97331
754-2515

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OSU, Batheller Hall 344
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754-3004

West Central Oregon Area
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OSU Extension Service
950 West 13th Street
Eugene, OR 97402
687-4243

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Corvallis, OR 97331
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OSU Extension Service
1301 Maple Grove Drive
Medford, OR 97501
776-7371

Bryan Boe
Energy Program Building Specialist
PO Box 122
Bend, OR 97709
388-2384

EPA-Funded Training Programs:

Asbestos Information and Training Centers:

Georgia Institute of Technology	(404) 894-3806
University of Kansas	(913) 491-0181
University of Illinois, Chicago	(312) 996-5762
Tufts University	(617) 381-3531 x5061
University of California at Berkeley	(415) 643-7143
University of Texas at Arlington	(817) 273-2581
UMDNJ Johnson Medical School	(201) 463-4500
Temple University	(215) 787-6479

Additional EPA-Funded Training Programs:

Texas A&M University	(409) 845-6682
University of Cincinnati	(513) 872-5733
University of Florida	(904) 392-9570
University of Utah	(801) 581-5710
National Asbestos Council (NAC)	(404) 292-0629

EPA-Office of Toxic Substances HOTLINE:
(202) 554-1404 or 554-1405

Private Asbestos Abatement Trainers:

The following list of possible asbestos abatement trainers in Oregon is given for informational purposes only. This is an incomplete list and inclusion of a firm on this list does not constitute endorsement by LBCC or the Oregon Department of Education.

Hall-Kimbrell
5319 SW Westgate, Suite 213
Portland, OR 97221
(800) 346-2860

National Asbestos Council, Inc.
Training Department
2786 North Decatur Rd., Suite 240
Decatur, GA 30033
(404) 292-3802

Hazcon, Inc.
16325 SW Boones Ferry Rd., Suite 107
Lake Oswego, OR 97035
(503) 636-7371

National Training Center, Inc.
Asbestos Training Project
123 NW Second Ave., Suite 309
Portland, OR 97209
(503) 224-8834

Asbestos Demolition/Removal Firms:

The following page lists asbestos removal firms that may be sources of information and expertise. Again, this list is incomplete and provided for informational purposes only.

ASBESTOS DEMOLITION/REMOVAL FIRMS

The following is a list provided only as a service. Other firms (unknown at the time of preparation) may provide similar services. The inclusion of a firm on this list does not constitute an endorsement by this office. Services provided and costs are solely determined between firm and customer.

AAMI-QHI
1627 W. 20th Street
Los Angeles, CA 90007
1-800-426-1961

AC & S, Inc.
2151 NW Wilson
Portland, OR 97210
(503) 227-6444

Air Quality Services
P.O. Box 271
Omak, WA 98841
(509) 826-4101

Arrow Industrial Mechanical Company
5107 NE 81st Avenue
Vancouver, WA 98682
(206) 892-1284

Baker Pacific Corporation
3220 East 29th Street
Long Beach, CA
(213) 426-0755

BCP Construction, Inc.
5319 SW Westgate Dr. Suite 253
Portland, OR 97221
(503) 297-7960

Bartells Materials Management, Inc.
3721 NW Front
Portland, OR 97208
(503) 228-9367

Can Environmental
1231 NW Hoyt Suite 205
Portland, OR 97225
(503) 274-9460

Carpenter Contractors, Inc.
Route 4, Box 49
Hillsboro, OR 97123
(503) 628-2488

Cascade Industrial Maintenance
2406 NE 100th
Vancouver, WA 98686
(206) 574-0561

Cascade Insulation, Inc.
P.O. Box 6498
Bend, OR 97708
(503) 388-2600

Central Painting, Inc.
4749 West Marginal Way, SW
Seattle, WA 98106
(206) 932-8116

Certified Asbestos Removal
12604 NE 172nd Avenue
Brush Prairie, WA 98606
(206) 254-4893

Crosby & Overton, Inc.
5420 N. Lagoon
Portland, OR 97217
(503) 283-1150

Cyclops Pipeline Service
P.O. Box 297
Wilsonville, OR 97070
(503) 682-7882

D2 Services
411 Bowmont Circle
Medford, OR 97504
(503) 773-1177

Fiberglass Maintenance Contractors
2300 SE 3rd Loop
Vancouver, WA 98661
(206) 573-7136

Form Contracting
P.O. Box 126
Harrisburg, OR 97446
(503) 995-6448

Indoor Environmental Services
P.O. Box 3397
Gresham, OR 97030
(503) 667-9056

Insulation Specialists
11965 SW Summercrest Drive
Tigard, OR 97223
(503) 684-6105

J.P. Industrial Environmental
6901 SE Lake Road
Milwaukie, OR 97267
(503) 655-1810

Kenner, Inc.
34771 Government Road
Cottage Grove, OR 97424
(503) 942-0739

Keystone Contracting, Inc.
P.O. Box 921
Vancouver, WA 98668
(206) 574-9040

Lake Oswego Insulation
5845 SW McEwan Road
Lake Oswego, OR 97034
(503) 245-6460

Long Services Corporation
8025 10th Avenue S.
Seattle, WA
(206) 763-8433

LVI Environmental Services, Inc.
205 N. Page
Portland, OR 97227
(503) 287-7344

NAACO
1937 Republic Avenue
San Leandro, CA 94577
(415) 860-7043

Power Master, Inc.
115 V Street
Vancouver, WA 98661
(206) 694-6012 or (503) 257-8801

Riedel Environmental Services
P.O. Box 03096
Portland, OR 97203
(503) 286-4656

— Roberts Environmental
1719 Irving
Eugene, OR 97402
(503) 688-4531

Spartan Insulation
7911 NE 33rd Drive, Suite 220
Portland, OR 97211
(503) 282-0175

Western Asbestos Abatement
6906 NE 40th, Suite B
Vancouver, WA 98661
(206) 693-1121 or (503) 775-6883

Willamette Insulation
1833 SE 7th
West Linn, OR 97068

* **W.L. Thomas, Inc**
P.O. Box 8
2710 SE Grand Prairie Road
Albany, OR 97321
(503) 967-7245 or 928-5383

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Asbestos in the Home

Section 8: Instructional Resources and Publications

Resources:

The following list of materials list multiple sources of written materials, slides, and video tape presentations. Some of these materials are available to copy, for rent, or for purchase. This is by no means a complete list. Many of these publications are available for the EPA Regional Office in Seattle.

Resources for Asbestos Training

1. Accident Prevention Division (APD) - training materials and film library. All programs are available without charge from:

    Accident Prevention Division
    Rm #204 Labor and Industries Building
    Salem, OR 97310

    Call for film catalog: 503/378-3272

    Asbestos video programs:

    Asbestos , (V) 30 min (general)

    Asbestos Abatement: a Video Guide , (V) 64 min

    Asbestos Abatement: Routine Maintenance, (V) 15 min

    Asbestos Abatement: The Process , (V) 50 min

    Asbestos Orientation: Asbestos-Covered Pipes , (V) 50 min

    Asbestos: Controlling the Hazard , (V) 35 min

    Procedures for Asbestos Removal , (V) 10 min

    Sampling for Toxic Substances , 314 slides

    Testing Buildings for Asbestos , (V) 70 min

    Respiratory and other Safety programs:

    Breathe Easy , 103 slides

    Isoamel Acetete & Sweetener, Aerosol Orientation , 82 slides

    Respirators (4-part series) Atmosphere-Supplying Respirators, (V) 15 min

    To Your Health: Hazardous Materials in the Workplace , 74 slides

    Other general worker safety programs

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2. Model Asbestos Accreditation Courses (EPA/Georgia Tech)

Course#1: Procedures and Practices for Asbestos Abatement Projects $112.85

Course#2: Model Curriculum for School Building Inspectors $112.17

Course#3: Model Curriculum for School Asbestos Management Planners $54.80

Course#4: Presentation to Accompany Guidance for Controlling Asbestos-Containing Materials in Buildings $16.81

Available from:

EPA AHERA Program Attn: Joyce Doe
Atlis Systems, Inc. (301)770-3000
6011 Executive Blvd.
Rockville, MD 20852

3. EPA Seattle/ Asbestos in Schools

Walt Jaspers - 206/442-2632
Jerry Chastein - materials 206/442-8282

EPA Publications: Office of Toxic Substances

Asbestos in Schools: guidance for service and maintenance personnel, EPA: 560/5-85-018

Guidance for Controllong Asbestos-Containing Materials in Buildings, EPA: 560/5-85-024

- known as the "Purple Book"
- slide presentation available (56 slides) Course #4

Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials, EPA: 560/5-85-030a

Asbestos-in-Schools: A Guide to New Federal Requirements for Local Education Agencies,

Asbestos Waste Management Guidance, EPA: 530/SW-85-007

4. NIOSH Respiratory Protection Manuals

Respiratory Protection - A Guide to the Employee $1.50

GPO#: 017-033-00327-1
DHEW(NIOSH)#: 78-193B

Respiratory Protection - An Employers Manual $2.30

GPO#: 017-033-00326-2
DHEW(NIOSH)#: 78-193A

5. Industrial Training Systems Corporation
609/983-7300

Asbestos Videotape programs

(820-30) - Asbestos: Understanding the Hazards (V) 22 min; $460

(820-31) - Asbestos: Small-Scale Short Duration Operations (V) Part I 18 min, Part II 11 min; $575

(820-36) - Understanding Asbestos in the Workplace (V) 7.3 min; $250

(820-34) - Large Scale Asbestos Removal Operation (V) 25 min; $460

(820-33) - Managing Large Scale Asbestos Removal Operation (V) 13 min; $460

(820-35) - Outdoor Asbestos Removal (V) 25 min; $460

6. Carl R. Stekelenburg
PO Box 244
Pine Mountain, GA 31822

Asbestos Awareness Training Tape 90 min; $158.50
- aimed at 2 hr awareness training requirement

7. Asbestos Control Technology, Inc. (ACTI)

West Regional Headquarters:
Hayward Industrial Park
23751 Eichler St.
Hayward, CA 94545
1-800/525-2284

National Headquarters:
PO Box 183
Maple Shade, N.J. 08052
1-800-221-1911

Available training materials:

Asbestos Abatement Worker Training: A Video Orientation , (V) 59 min $89.95

Asbestos Abatement Workers Handbook, 135 p ; $19.95

A Video Guide to Negative-Air Filtration At Asbestos Abatement Sites (V) 42 min $89.95

Controlling Asbestos Contamination With Negative-Air Filtration Systems , 120 p $19.95

Encapsulation: Material & Equipment , (V) 17 min ; $39.95

Asbestos Hazard Management Guidebook: Guidebook to Abatement , 399p ; $45.00

Asbestos Removal in Occupied Buildings: Sophisticated Procedures for Structures with Operating HVAC Systems , text ; $14.95

Asbestos Abatement: A Video Guide to the Process , (V) 64 min ; $89.95

HEPA Vacuum Cleaners for Asbestos Abatement , (V)18 min ; $39.95

Surfactants for Asbestos Removal , (V) 18 min , $39.95

Asbestos in Buildings: A National Survey (USEPA) , 256 p ; $19.95

Asbestos Abatement: Risks & Responsibilities , 248 p ; $75.00

Asbestos in Schools and Other Buildings: A Laymen's Guide to the Legal Issues text ; $19.95

Asbestos Abatement & Removal: Legal Considerations and Planning , text ; $19.95

U.S. Attorney General's Asbestos Liability Report to Congress , 213 p ; $19.95

Asbestos Response Team Training Video , (V) 45 min ; $89.95

Asbestos Problems: A Public Awareness Video , (V) 20 min ; $89.95

Maintaining Asbestos-Covered Pipes & Surfaces: A Custodial Workers Video Guide , (V) 50 min ; $89.95

The Glove Bag Book , text ; $19.95

Custodial Asbestos Awareness & Glove Bag Removal Video , (V) 22 min $89.95

A Guide to Respiratory Protection For the Asbestos Abatement Industry (USEPA/NIOSH), 166 p ; $19.95

Asbestos Respirator Training Manual , 122 p ; $24.95

Respirators For Asbestos: A Video Orientation , (V) 30 min ; $89.95

Powered, Air-Purifying Respirators , (V) 18 min ; $39.95

Type-C Respirators Explained: A Video Guide to Supplied-Air Breathing Systems , (V) 90 min ; $89.95

Asbestos Safety Inspection & Air Monitoring Manual , 208 p ; $29.95

Asbestos Air Monitoring: A Comprehensive Video Guide , (V) ; $89.95

Testing Buildings for Asbestos Hazards , (V) 70 min ; $89.95

Personal Air Sampling Pump , (V) 12 min ; $39.95

8. Asbestos Abatement Council of AWCI
(AWCI-Association of the Wall and Ceiling Industries)

Asbestos Abatement Council of AWCI
25 K Street N.E.
Washington, DC 20002

(202)783-2924

Series of nine training videotapes, total cost: $995.

Tape #1: Orientation

Tape #2: Worker Protection

Tape #3: Worker Safety

Tape #4: Equipment Operation

Tape #5: Sealing and Preparation of Work Area

Tape #6: Asbestos Removal

Tape #7: Encapsulation and Enclosure

Tape #8: Disposal Procedures

Tape #9: Final Clean Up and Inspection

ASBESTOS GLOSSARY

ABIH	- American Board of Industrial Hygiene
Acoustical Insulation	- The general application or use of asbestos for the control of sound due to its lack of reverberant surfaces.
Acoustical Tile	- A finishing material in a building usually found in the ceiling or walls for the purpose of noise control.
Aggressive Sampling	- Air sampling which takes place after final clean-up while the air is being physically agitated to produce a "worst case" situation.
AIA	- Asbestos Information Association
AIA	- American Institute of Architects
AIA	- American Insurance Association
AIHA	- American Industrial Hygiene Association
AIHA Accredited Laboratory	- A certification given by the AIHA to an analytical laboratory that has successfully participated in the "Proficiency Analytical Testing" program for quality control as established by the National Institute for Occupational Safety and Health.
Airborne Asbestos Analysis	- Determination of the amount of asbestos fibers suspended in a given amount of air.
Air Diffuser	- A device designed to disperse an air stream throughout a given area.
Air Lock	- A system of enclosures consisting of two polyethylene curtained doorways at least three feet apart that does not permit air movement between clean and contaminated areas.
Air Man	- An industrial hygienist or other qualified individual who collects air samples and monitors the asbestos abatement worksite.
Air Monitoring	- The process of measuring the airborne fiber concentration of a specific quantity of air over a given amount of time.
Air Plenum	- Any space used to convey air in a building or structure. The space above a suspended ceiling is often used as an air plenum.

Algorithm	A universally accepted procedure developed for the purpose of solving a particular problem. Algorithms developed for asbestos provide a numerical index for evaluating a degree of hazard in a particular area. The Sawyer Algorithm and the Ferris Index are two, but neither are widely used today.
Alveolar Macrophages	Highly specialized mobile cells in the lungs that attempt to engulf and digest such lung hazards as dusts or fibers.
Alveoli	Located in clusters around the respiratory bronchides of the lungs, this is the area in which true respiration takes place.
Ambient Air	The surrounding air or atmosphere in a given area under normal conditions.
Amended Water	Water to which a chemical wetting agent (surfactant) has been added to improve penetration into asbestos-containing materials that are being removed.
Amosite	An Asbestiform mineral of the amphibole group containing approximately 50% silicon and 40% Iron (II) Oxide, and is made up of straight, brittle fibers, light gray to pale brown in color.
Amphibole	One of the two major groups of minerals from which the Asbestiform minerals are derived, distinguished by their chain-like crystal structure and chemical composition.
ANSI	American National Standards Institute
Approved Landfill	A site for the disposal of asbestos-containing and other hazardous wastes that has been given EPA approval.
Aspect Ratio	The length of a fiber vs. its width.
Asbestiform Minerals	Minerals which, due to their crystal structures and chemical composition, tend to be separated into fibers and can be classified as a form of asbestos.
Asbestos	A generic name given to a number of naturally occurring hydrated mineral silicates that possess a unique crystalline structure, are incombustible in air, and are separable into fibers. Asbestos includes the asbestiform varieties of chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite-grunerite); anthophyllite; and actinolite.
Asbestos Abatement	Procedures to control fiber release from asbestos-containing materials in buildings.

Asbestos Control	Minimizing the generation of airborne asbestos fibers until a permanent solution is developed.
Asbestos Exposure Assessment System	A decision tool which can be used to determine the extent of the asbestos hazard that exists in a building, and which can also be used to develop corrective actions.
Asbestos Fibers	Fibers with their length being greater than five microns (length to width ratio of 3:1), generated from an asbestos-containing material.
Asbestos Standard	Reference to the OSHA requirements in the general industry standards regarding asbestos exposure (29 CFR 1910.1001), and EPA National Emission Standard for Hazardous Air Pollutants (NESHAP) (40 CFR 61, subpart M).
Asbestosis	A non-malignant, progressive, irreversible lung disease caused by the inhalation of asbestos dust and characterized by diffuse fibrosis.
Atmospheres Immediately Dangerous to Life or Health	A hazardous atmosphere to which exposure will result in serious injury or death in a matter of minutes, or cause serious delayed effects.
Atmosphere Supplying Respirators	Respiratory protection devices which exclude workplace air altogether and provide clean air from some independent source.
Bid	A statement of the price at which a contractor will complete a given project.
"Blue Book"	EPA publication of March 1983 titled, "Guidance for Controlling Friable Asbestos-Containing Materials in Buildings." Now replaced by 1985 revised edition.
Bridging Encapsulant	The application of a sealant over the surface of asbestos-containing material to prevent the release of asbestos fibers.
Bronchi	Primary branches of the trachea (windpipe).
Bronchogenic Cancer	An abnormal cell growth in the primary branches of the trachea (windpipe).
Cancer	A cellular tumor which normally leads to premature death of its host unless controlled.
Carbon Monoxide	A highly toxic colorless and odorless gas.
Ceiling Concentration	The maximum allowable level of toxic material that can be present at any given point in time.

Cementitious - Asbestos-containing materials that are densely packed, granular and are friable.

CFM - Cubic feet per minute

Chrysotile (white asbestos) - The only asbestiform mineral of the serpentine group which contains approximately 40% each of silica and magnesium oxide. It is the most common form of asbestos used in buildings.

CIH - An industrial hygienist who has been granted certification by the American Board of Industrial Hygiene.

Cilia - Tiny hair-like structures in the windpipe and bronchi of the lung passages that help force undesirable particles and liquids up and out of the lungs.

Claustrophobia - The fear of being in enclosed or narrow spaces.

Clean Area - The first stage of the decontamination enclosure system in which workers prepare to enter the work area.

Clerk of the Works - A person who coordinates and oversees all activities on an asbestos abatement job site.

Closed Circuit SCBA - A self-contained respiratory protection device in which the air is rebreathed after the exhaled carbon dioxide has been removed and the oxygen content restored.

Columns - The building components which support the structural beams.

Compressed Oxygen Cylinder Type Closed Circuit SCBA - A self-contained respiratory protection device in which air is supplied from a compressed air cylinder. The exhaled air is filtered to remove carbon dioxide, and additional breathing air is provided.

Concrete-like Asbestos - Hard, non-friable asbestos-containing material that requires a mechanical force to penetrate its surface.

Contaminated Items - Any objects that have been exposed to airborne asbestos fibers without being sealed off or isolated.

Continuous Flow Airline Device - A respirator that maintains a constant airflow to the wearer.

Contract Specifications - A set of guidelines that a contractor must follow when conducting an asbestos abatement job.

CPSC - Consumer Product Safety Commission

Criteria Document	NIOSH publications that address toxic materials, analytical methods, personal protective equipment, etc.
Decontamination Enclosure System	A series of connected rooms with polyethylene curtained doorways for the purpose of preventing contamination of areas adjacent to the work area.
Demand Airline Device	A respirator in which air enters the facepiece only when the wearer breathes in.
Dirty Area	Any area in which the concentration of airborne asbestos fibers exceeds 0.01 f/cc, or where there is visible asbestos residue.
Dispersion Staining	Used in conjunction with polarized light to identify bulk samples. A particle (fiber) identification technique based on the difference between light dispersion of a particle (fiber) and a liquid medium in which it is immersed.
Duct Tape	Heavy gauge tape capable of sealing joints or adjacent sheets of polyethylene.
Dust Mask	Single use or disposable dust respirator with a low protection factor.
Electron Microscopy	A method of asbestos sample analysis which utilizes an electron beam to differentiate between fibers.
Employee Notification	Informing employees or building occupants if asbestos is present in the building, also informing them of the hazards associated with asbestos exposure, what is being done to eliminate the problem, etc.
Employer's Liability	Legal responsibility imposed on an employer requiring him/her to pay damages to an injured employee.
Encapsulation	The coating of asbestos-containing material with a bonding or sealing agent to prevent the release of airborne fibers.
Encapsulant (sealant)	A substance applied to asbestos-containing material which controls the release of airborne asbestos-fibers.
EPA	Environmental Protection Agency
EPA Regulations	Regulatory standards which cover emissions into the outside environment from a workplace and disposal of hazardous wastes from job sites.
Epidemiology	The study of occurrence and distribution of disease throughout a population.

Equipment Room	The last stage or room of the worker decontamination system before entering the work area.
Establishing Responsibility	An asbestos program manager is designated and is given the responsibility for directing and managing asbestos control program activities.
Eyepiece	A component of a full facepiece respirator which is a gas-tight transparent window through which the wearer may see.
Facepiece	The portion of a respirator which covers the wearer's nose, mouth, and eyes in a full facepiece.
Fallout	The intermittent release of fibers which occurs as a result of weakened bonds in the material, or because of deterioration.
F/CC	Fibers per cubic centimeters of air
FEV_1	The maximum volume of air that can be forced from an individual's fully inflated lungs in one second (Forced Expiratory Volume - one second)
Fiber Containment	Enclosing or sealing off an area having airborne asbestos fibers present so that the fibers will not migrate resulting in contamination of other areas.
Fiber Control	Minimizing the amount of airborne fiber generation through the application of amended water onto asbestos-containing material, or enclosure (isolation) of the material.
Fiber Releasability	The potential for generation of airborne fibers from an asbestos-containing source.
Fiber Reynolds Number	Refers to the diameter of a fiber.
Fibrosis	A condition of the lungs caused by the inhalation of excessive amounts of fibrous dust marked by the presence of scar tissue.
Fibrous	Composed almost entirely of fibers.
Fibrous Aerosol Monitor (FAM)	A portable survey instrument with the capability of providing instantaneous airborne fiber concentration readings.
Fireproofing	Spray- or trowel-applied fire resistant materials.

Friable Asbestos	Any materials that contain more than 1% asbestos by weight and can be crumbled, pulverized, or reduced to powder by hand pressure.
Full Facepiece Respirator	A respirator which covers the wearer's entire face from the hairline to below the chin.
FVC	Forced Vital Capacity. The measured quantity of air that be forcibly exhaled from a person's lungs after full inhalation.
Glovebag	Plastic bag-type enclosure placed around asbestos-containing pipe lagging so that it may be removed without generating airborne fibers into the atmosphere.
Glove-box (bag)	Plastic enclosure placed around a specific operation such as a valve to contain small areas of materials for asbestos removal.
Grade D Air	Breathing air which has between 19.5% - 23% oxygen, no more than 5 mg/m^3 of condensed hydrocarbons, no more than 20 ppm of carbon monoxide, no pronounced odor, and a maximum of 1000 ppm carbon dioxide.
Ground Fault Circuit Interrupter	A circuit breaker that is sensitive to very low levels of current leakage from a fault in an electrical system.
Ground Fault Interrupter	A device which automatically de-energizes any high voltage system component which has developed a fault in the ground line.
Half Mask - High Efficiency	A respirator which covers one-half of the wearer's face and is equipped with filters capable of screening out 99.97% of all particles larger than 0.3 microns.
Heat Cramps	Painful spasms of heavily used skeletal muscles such as hands, arms, legs, and abdomen which are sometimes accompanied by dilated pupils and weak pulse resulting from depletion of the salt content of the body.
Heat Exhaustion	A condition resulting from dehydration and/or salt depletion, or lack of blood circulation which is usually accompanied by fatigue, nausea, headache, giddiness, clammy skin, and a pale appearance.
Heat Stress	A bodily disorder associated with exposure to excessive heat.
Heat Stroke	The most severe of the heat stress disorders resulting from the loss of the body's ability to sweat which is characterized by hot dry skin, dizziness, nausea, severe headache, confusion, delerium, loss of consciousness, convulsion, and coma.

HEPA	-	High Efficiency Particulate Air (Air Filter)
HEPA Filtered Vacuum	-	A high efficiency particulate air (HEPA) filtered vacuum capable of trapping and retaining 99.97% of all particles larger than 0.3 microns.
Holding Area	-	The airlock between the shower room and the clean room in a worker decontamination system.
Homogeneous	-	Evenly mixed and similar in appearance and texture throughout.
Hose Masks	-	Respirators that supply air from an uncontaminated source through a strong, large diameter hose to the facepiece that does not use compressed air or have any pressure regulating devices.
HVAC System	-	Heating, Ventilation, and Air Conditioning system usually found in large business and industry facilities.
Industrial Hygienist	-	A professional qualified by education, training, and experience to recognize, evaluate, and develop controls for occupational health hazards.
Joists	-	The structural building component which the flooring or roof rests on.
Local Exhaust Ventilation	-	The mechanical removal of air contaminants from a point of operation.
Logbook	-	An official record of all activities which occurred during a removal project.
Lung Cancer	-	An uncontrolled growth of abnormal cells in the lungs which normally results in the death of the host.
Make-up Air	-	Supplied or recirculated air to offset that which has already been exhausted from an area.
MCEF	-	Mixed Cellulose Ester Filter which is one of several different types of media used to collect asbestos air samples.
Mechanical Filter Respirator	-	A respiratory protection device which offers protection against airborne particulates including dusts, mists, metal fumes, and smokes.
Medical Examinations	-	An evaluation of a person's health status conducted by a medical doctor.
Medical History	-	A record of a person's past health record, including all the hazardous materials that they have been exposed to and also any injuries or illnesses which might dictate their future health status.

Mesothelioma - A relatively rare form of cancer which develops in the lining of the pleura or peritoneum with no known cure.

Method 7400 - NIOSH sampling and analytical method for fibers using phase-contrast microscopy. Replaces method P&CAM 239.

Micron - One millionth of a meter

Mil - Prefix meaning one-thousandth

Millimeter - One-thousandth of a meter

Mineral Wool - A commonly used substitute for asbestos

MSDS - Material Safety Data Sheet

MSHA - Mine Safety and Health Administration

Negative Pressure - An atmosphere created in a work area enclosure such that airborne fibers will tend to be drawn through the filtration system rather than leak out into the surrounding areas. The air pressure inside the work area is less than that outside the work area.

NESHAP - National Emission Standards for Hazardous Air Pollutants -- EPA Regulation 40 CFR subpart M, part 61.

NIOSH - The National Institute for Occupational Safety and Health which was established by the Occupational Safety and Health Act of 1970.

NIOSH/MSHA - The official approving agencies for respiratory protective equipment who test and certify respirators.

Numerical Value - Refers to the types and percentages of asbestos present in a given sample.

Oilless Compressor - An air compressor that is not oil lubricated, which does not allow carbon monoxide to be formed in the breathing air.

Open Circuit SCBA - A type of self-contained breathing unit which exhausts the exhaled air to the atmosphere instead of recirculating it.

Operations and Maintenance Plan (OMP) - Specific procedures and practices developed for the interim control of asbestos-containing materials in buildings until it is removed.

"Orange Booklets"	-	EPA publications issued in March 1979 titled: Asbestos-Containing Materials in School Buildings: A Guidance Document, parts I and II.
OSHA	-	The Occupational Safety and Health Administration which was created by the Occupational Safety and Health Act of 1970; serves as the enforcement agency for safety and health in the workplace environment.
Oxygen Deficient Atmosphere	-	Any atmosphere containing less than 19.5 % oxygen.
PAT Samples	-	Proficiency Analytical Testing of asbestos samples conducted through NIOSH for laboratories involved with the analysis of asbestos samples.
Particulate Contaminants	-	Minute airborne particles given off in the form of dusts, smokes, fumes, or mists.
P&CAM 239	-	A NIOSH sampling and analytical method for measuring airborne fibers using phase-contrast microscopy.
PEL	-	Permissible Exposure Limit as stated by OSHA
Penetrating Encapsulant	-	Liquid material applied to asbestos-containing material to control airborne fiber release by penetrating into the material and binding its components together.
Peritoneum	-	The thin membrane that lines the surface of the abdominal cavity.
Personal Protective Equipment (PPE)	-	Any material or device worn to protect a worker from exposure to, or contact with, any harmful material or force.
Personal Sample	-	An air sample taken with the sampling pump directly attached to the worker with the collecting filter placed in the worker's breathing zone.
Personnel Protection	-	Notification and instruction of all workers prior to the beginning of a project as to the hazards associated with the job and what they can do to protect themselves from these hazards.
PF	-	Protection factor as provided by a respirator which is determined by dividing the airborne fiber concentration outside of the mask by the concentration inside the mask.
Phase Contrast Microscopy (PCM)	-	An optical microscopic technique used for the counting of fibers in air samples, but which does not distinguish fiber types.

Pipe Lagging	-	The insulation or wrapping around a pipe.
Pleura	-	The thin membrane surrounding the lungs, and which lines the internal surface of the chest cavity.
Pneumoconiosis	-	A condition in the lungs which is a result of having inhaled various dusts and particles for a prolonged period of time.
Polarized Light Microscopy (PLM)	-	An optical microscopic technique used to distinguish between different types of asbestos fibers by their shape and unique optical properties.
Polyethylene	-	Plastic sheeting which is often used to seal off an area in which asbestos removal is taking place for the purpose of preventing contamination of other areas.
Posting	-	Refers to caution or warning signs which should be posted in any area in which asbestos removal is taking place, or where airborne fiber levels may present a health hazard.
Powered Air Purifying Respirator (PAPR)	-	Either a full facepiece, helmet, or hooded respirator that has the breathing air powered to the wearer after it has been purified through a filter.
Pre-Construction Conference	-	A meeting held before any work begins between the contractor and the building owner at which time the job specifications are discussed and all details of the work agreed upon.
Pre-Employment Physical	-	Complete medical examination of an employee before the job begins to determine whether or not he/she is fit to perform the functions of their employment.
Pressure Demand Airline Devices	-	A respiratory protection device which has a regulator and valve design such that there is a continuous flow of air into the facepiece at all times.
Prevalent Levels	-	Levels of airborne contaminants occurring under normal conditions.
Prevalent Samples	-	Air samples taken under normal conditions (background samples).
Progress Payments	-	A pre-work agreement whereby the building owner pays the contractor after completion of certain phases of the project.
Protective Clothing	-	Protective, lightweight garments worn by workers performing asbestos abatement to keep gross contamination off the body.

Pulmonary	Pertaining to, or affecting the lungs, or some portion thereof.
Pulmonary Function Tests	A part of the medical examination required to determine the health status of a person's lungs.
Purple Book	EPA publication of June 1985 titled, "Guidance for Controlling Asbestos-Containing Materials in Buildings, 1985 Edition." This document is a revision of the "Blue Book."
Qualitative Fit Test	A method of testing a respirator's face-to-facepiece seal by covering the inhalation or exhalation valves and either breathing in or out to determine the presence of any leaks.
Rales	An abnormal sound heard from the lungs which does not necessarily indicate any specific disease.
Random Sample	A sample drawn in such a way that there is no set pattern and is designed to give a true representation of the entire population or area.
Recordkeeping	Detailed documentation of all program activities, decisions, analyses, and any other pertinent information to a project.
Resolution	The ability to distinguish between individual objects, as with a microscope.
Respirable	Breathable
Respirator Program	A written program established by an employer which provides for the safe use of respirators on their job sites.
Resuspension	The secondary dispersal or re-entrainment of settled fibers which have previously been released by impact or fallout.
Rip-Out	The actual removal of asbestos-containing materials from a building.
Risk	The likelihood or probability of developing a disease, or being hurt, as the result of exposure to a contaminant or a condition.
Safety Glasses	Protective eye equipment.
Scanning Electron Microscopy (SEM)	A method of microscopic analysis which utilizes an electron beam directed at the sample and then collects the beams that are reflected to produce an image from which fibers can be identified and counted.

Scanning Transmission Electron Microscopy (STEM)	-	A combination of a transmission electron microscope with scanning and focusing coils so that a beam of electrons can be scanned over the sample or pinpointed in a particular area.
SCBA	-	Self-Contained Breathing Apparatus
Serpentine	-	One of the two major groups of minerals from which the asbestiform minerals are derived, distinguished by their tubular structure and chemical composition.
Shower Room	-	A room between the clean room and the equipment room in a worker decontamination system in which workers take showers when leaving the work area.
Spirometer	-	An instrument which measures the volume of air being expired from the lungs.
Steel Beams	-	Building components which support the joists.
Structural Member	-	Any load-supporting member such as beams and load supporting walls of a facility.
Structural Steel	-	A building component which is designed to support other structural members in a building.
Substrate	-	The material or existing surface located under or behind the asbestos-containing material.
Supplied Air Respirator	-	A respirator that has a central source of breathing air which is supplied to the wearer by way of an airline.
Surfactant	-	A chemical wetting agent added to water to improve its penetration abilities into asbestos-containing materials.
TLV	-	Levels of contaminants established by the American Conference of Governmental Industrial Hygienists to which it is believed that workers can be exposed to with minimal adverse health effects.
Transmission Electron Microscopy (TEM)	-	A method of microscopic analysis which utilizes an electron beam that is focused onto a thin sample. As the beam penetrates (transmits) through the sample, the difference in densities produces an image on a fluorescent screen from which samples can be identified and counted.
Treated Cellulose	-	An insulation material made of paper or wood products with fire-retarding treatment added.
Tumor	-	A swelling or growth of cells and tissue in the body which does not serve a useful purpose.

TWA	Time-Weighted Average, as in air sampling.
Type B Reader	A physician with specialized training in reading x-rays, specifically in recognizing lung disorders.
Type C Supplied-Air Respirator	A respirator designed to provide a very high level of protection which supplies air to the wearer from an outside source such as a compressor.
USEPA	United States Environmental Protection Agency
Vermiculite	A micaceous mineral that is sometimes used as a substitute for asbestos which is lightweight and highly water-absorbent.
Visible Emissions	Airborne fibers given off from an asbestos-containing source that are visible to the human eye.
Visual Inspection	A walk-through type inspection of the work area to detect incomplete work, damage, or inadequate clean up of a worksite.
Washroom	A room between the work area and the clean room in the equipment decontamination enclosure system where workers shower.
Water Damage	Deterioration or delamination of ceiling or wall materials due to leaks from plumbing or cracks in the roof.
WBGT	Wet Bulb Globe Temperature, a heat stress index.
Wet Cleaning	The process of eliminating asbestos contamination from surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water.
Wetting Agents	Materials that are added to water which is used for wetting the asbestos-containing material in order for the water to penetrate more effectively.
Workmen's Compensation	A system of insurance required in some states by law, financed by employers, which provides payments to employees or their families for occupational injuries, illnesses, or fatalities resulting in loss of wage or income incurred while at work.

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Asbestos Abatement Certification

Small-Scale Worker Student Manual

CE059958

Prepared by Ron Sharman, Linn-Benton Community College, Albany, OR and the Oregon State Department of Education

Small-Scale, Short-Duration Asbestos Abatement

Draft Copy Notes:

This is a draft copy of a training program designed to accompany at least 16 hours of classroom time for small-scale, short-duration asbestos abatement workers. The outline given here fulfills requirements described under AHERA and worker certification requirements given by the Department of Environmental Quality. Materials in this manual were pulled from various EPA publications covering asbestos and asbestos abatement projects.

Small-Scale, Short-Duration Asbestos Abatement

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Small-Scale, Short-Duration Asbestos Abatement

Manual Contents:

Section I: Course Introduction
Section 2: Physical Characteristics of Asbestos
Section 3: Health Effects of Asbestos Exposure
Section 4: State and Federal Asbestos Laws
Section 5: Personal Protection Equipment; Respiratory Protection
Section 6: State of the Art Work Practices
Section 7: Hands-On Activities; Employee Protection
Section 8: Hands-On Activities; Glovebag Techniques
Section 9: Hands-On Activites; Mini-Enclosures
Appendix: Asbestos Glossary

Section 1: Course Introduction or

Why Are You Here?

In this first section you will take an overview look at the needs and requirements for asbestos removal training. We will also review the content of this course and the course materials that will be used.

Section objectives: information in this section will allow the participants to:

1. Understand the abbreviation AHERA and how it affects asbestos and maintenance personnel in schools.
2. Outline the "chain-of-command" of asbestos abatement in schools and the people involved in the process.
3. Define the responsibilities and limitations of the small-scale worker.
4. Understand the different levels of asbestos operation, maintenance, and abatement projects.
5. Become familiar with the course contents and the student materials used to support each section.
6. Determine a personal status of current knowledge concerning asbestos operation, maintenance, and abatement projects through the use of a pre-course self-test.

Section 1: Course Introduction Outline

Tips on how to use this outline:

Each section in this handbook contains an outline covering all the important terms and information that the instructor will cover in that section. Extra space is given for notes, comments, and other information that you will want to save. Use this outline to get the most out of the presentation.

Section 1: Outline

1. Asbestos Hazard Emergency Response Act (AHERA)

   Local Education Agency (LEA)

   Asbestos Containing Materials (ACM)

   LEA Designate
      Name:
      Phone:

   Inspection and Management Plan
      Location of management plan:

   Operations and Maintenance Plan

2. Accredited Workers/ Levels of Asbestos Abatement

   Asbestos Awareness Training

   Worker for Small-Scale Asbestos Abatement

   Worker for Full-Scale Asbestos Abatement

   Supervisors for Full-Scale Asbestos Abatement

3. State of the Art Asbestos Abatement Work Practices

   Worker Protection
      - Respiratory

      - Protective clothing

   Clean up activities

   Glove-bags

   Mini-enclosure

   Full scale abatement

   Air monitoring

Waste disposal

4. Training Course Outline

Daily schedule

Student Handbook

Use of course quizes

Pre-course self-evaluation

Certification test

5. Pre-Course Self-Test

Section 2: Physical Characteristics of Asbestos

or

What is Asbestos?

Section objectives: information in this section will allow the participants to:

1. Understand the mineral classification of asbestos fibers and how they are measured.
2. Identify the basic types of asbestos and their characteristics.
3. Recognize the aerodynamic characteristics of asbestos fibers and how this characteristic affects the air quality of the workplace.
4. Understand the commercially useful physical characteristics os asbestos.
5. Recognize how various types of asbestos are used in building materials and where they might be found in buildings.
6. Define the terms friable and non-friable as used to describe asbestos containing building materials.
7. Gain an understanding of the criteria used to to determine whether or not asbestos materials present in building represent a hazard to the occupants.
8. Recognize damage, deterioration, and/or delamination of asbestos containing building materials.
9. Identify the possible response actions used in the control of asbestos containing building materials.
10. Gain an understanding into how the operation and maintenance program is used to control asbestos fiber releases.

Section 2: Characteristics of Asbestos Outline

1. Mineralogy of Asbestos

   Crystal structure

   Mining and manufacture of asbestos products

   Definition of asbestos fibers

2. Types of Asbestos

   Chrysotile

   Crocidolite

   Amosite

   Others

3. Aerodynamic characteristics of asbestos fibers

   Friable vs. non-friable asbestos material

   Time for asbestos fibers to settle

Action level of airborne fibers

Permissible Exposure Limit for airborne fibers

4. Commercially useful characteristics of asbestos

   Strong, flexible, fireproof, lightweight, chemically inert

5. Asbestos containing building materials (ACBM)

   Surfacing materials

   Thermal system insulation

   Miscellaneous building materials

6. Hazard assessment of ACBM

   Friable and non-friable ACBM

   Current condition of ACBM

   Accessibility and damage potential

   Asbestos fibers in the air

7. AHERA assessment classification for ACBM

Damaged or significantly damaged thermal system insulation

Damaged friable surfacing ACM

Significantly damaged friable surfacing ACM

Damaged or significantly damaged friable miscellaneous ACM

ACBM with potential for damage

ACBM with potential for significant damage

Any remaining friable ACBM

8. Control of ACBM: response actions

Repair

Encapsulate

Enclosure

Removal

9. Operations and Maintenance Program

Purpose of O&M program

1) clean up asbestos fibers previously released
2) prevent future fiber release
3) continuously monitor the condition of ACM

Who should participate: certified workers

Elements of the O&M program

1) documentation, education, and training

2) initial cleaning

3) monthly or semiannual cleaning

4) building maintenance

5) periodic inspection

Historical Background of the Asbestos Industry

1850 - Discovery of chrysotile in Quebec.

1880s - Asbestos first used as an insulation material.

1878 - First asbestos products used at world fair in Paris.

1890 - Beginning of the textile processing of Quebec chrysotile in the USA.

1898 - Henry Ward Johns (Johns-Manville) dies of asbestos lung desease.

1932 - US Public Health Service reports case of a worker who develops asbestosis from maintaining a heating plant in a government hospital.

1938 - US Public Health Service calls for a limit on asbestos fiber exposure.

1946 - Widespread application of sprayed-on asbestos insulation in US buildings.

1964 - Dr. Irving Selikoff's landmark research on asbestos desease.

1971 - EPA bans the manufacture of asbestos pipe-lagging; casi and aircell.

1972 - OSHA limits workplace asbestos exposure to 5 f/cc.

1973 - EPA prohibits spraying of asbestos materials for insulation, fire protection, and acoustic materials. Bans most sprayed-on, friable ACM greater than 1%.

1975 - EPA bans asbestos joint compounds and spackles.

1976 - OSHA limits workplace asbestos exposure to 2 f/cc.

1977 - US Consumer Product Safety Commision bans asbestos patching compounds.

1978 - EPA bans all sprayed-on friable ACM.

Historical Background continued:

1982	- EPA: Friable ACM in schools; Identification and Notification rule (Schools Rule).
1983	June 28: Schools inspected for friable ACM.
1986	- OSHA orders tenfold reduction in the amount of asbestos in the workplace. - EPA proposes ban of some asbestos products.
1986	- October 22: Presedent Reagan signs into law Asbestos Hazard Emergency Response Act (AHERA); identification, evaluation, and control of ACM in schools.
1987	- October 17: EPA issues final rules for AHERA. - December 14: AHERA regulations become effective. - Workers must be accredited. - Toxic Substances Control Act (TSCA) is upgraded to reflect AHERA: workplace asbestos exposure level reduced to 0.2 f/cc.
1988	- October 20: Schools submit inspection and management plans to the governer.
1989	- Jan 1: Oregon DEQ required worker certification. - July 9: AHERA management plan implementation.

1

Introduction

The Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) have been concerned with the potential health hazards associated with exposure to asbestos since the early 1970s. The concern is based on medical evidence relating to exposure of airborne asbestos by asbestos workers and their families to various types of cancer as well as noncancerous respiratory diseases.

In recognition of these health hazards, this manual provides guidance on how best to handle asbestos-containing waste materials during generation, transport, and final disposal. Waste handling practices presented include not only those needed to meet current EPA and OSHA requirements, but also additional recommendations reflecting practices needed to further minimize exposure to asbestos. In most cases, the recommendations are consistent with state-of-the-art procedures currently being followed by most knowledgeable asbestos waste handling firms. However, because state and local requirements may be more restrictive than federal standards, these agencies should be contacted before handling asbestos containing materials.

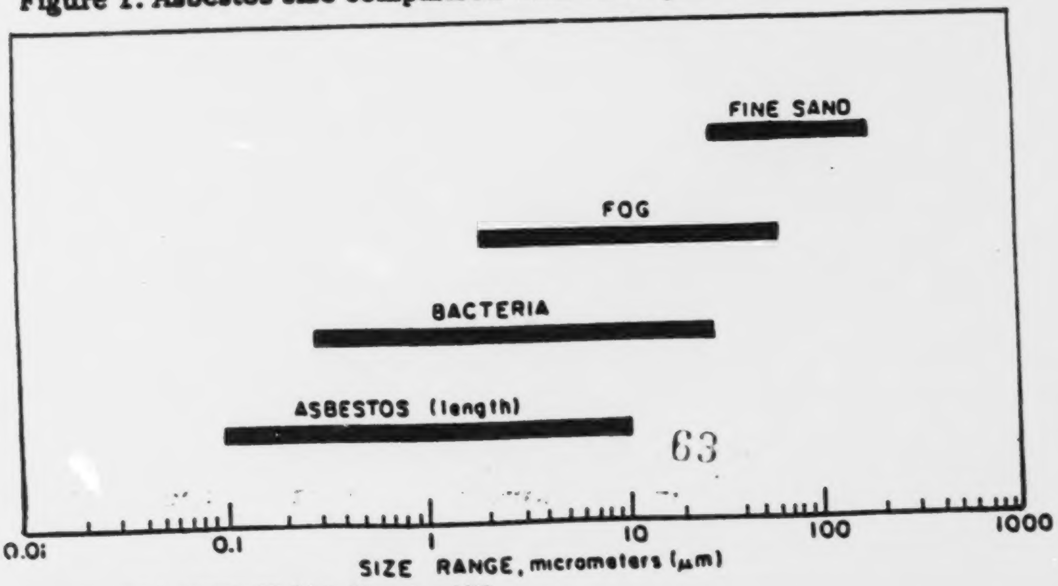
Description of Asbestos

Asbestos is a naturally occurring family of fibrous mineral substance. The typical size of asbestos fibers, as illustrated relative to other substances in Figure 1, is 0.1 to 10μ in length, a size that is not generally visible to the human eye. Somewhat longer fibers are used in making textile products. When disturbed, asbestos fibers may become suspended in the air for many hours, thus increasing the extent of asbestos exposure for individuals within the area.

EPA regulations identify the following types of asbestos: chrysotile. amosite. crocidolite. anthophyllite. actinolite. and tremolite. Approximately 95 percent of all asbestos used in commercial products is chrysotile. Asbestos became a popular commercial product because it is noncombustible. resistant to corrosion. has a high tensile strength. and a low electrical conductivity. However. asbestos had very little use until the early 1900's when it was employed as thermal insulation for steam engines. Since then. asbestos fibers have been mixed with various types of binding materials to create an estimated 3.000 different commercial products. Asbestos has been used in brake linings. floor tile. sealants. plastics. cement pipe. cement sheet. paper products. textile products. and insulation. The amount of asbestos contained in these products varies significantly. from 1 to 100 percent. depending on the particular use.

The potential of an asbestos-containing product to release fibers is dependent upon its degree of friability. Friable means that the material can be crumbled with hand pressure and. therefore. is likely to emit fibers. The fibrous or fluffy spray-applied asbestos materials found in many buildings for fireproofing. insulating. sound proofing. or decorative purposes are generally considered friable. Pipe and boiler wrap are also friable and found in numerous buildings. Some materials. such as vinyl-asbestos

Figure 1. Asbestos size comparison with other particles.



Source: EPA 450/2-78-014. March 1978.

floor tile, are considered nonfriable and generally do not emit airborne fibers unless subjected to sanding or sawing operations. Other materials, such as asbestos cement sheet and pipe, can emit asbestos fibers if the materials are subjected to breakage or crushing in the demolition of structures that contain such materials. For this reason, such materials are considered friable under the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations for the demolition of structures.

Identifying Asbestos

Only on rare occasions can the asbestos content in a product be determined from product labeling or by consulting the manufacturer, since most products as placed in use are no longer labeled. A description of common asbestos-containing products is presented in Section 2 of this manual. Further information on asbestos content of consumer products is available through the Consumer Product Safety Commission Hotline:

Continental United States	1-800-638-2772
Maryland only	1-800-492-8363
Alaska, Hawaii, Puerto Rico, Virgin Islands	1-800-638-8333

Positive identification of asbestos requires laboratory analysis of samples. Standard laboratory analysis using polarized light microscopy (PLM) may cost $30 to $60 per sample. For information on locating a laboratory capable of performing the analysis, contact any of EPA's Regional Asbestos Coordinators listed in Appendix B or call EPA's toll-free number for assistance:

Continental United States	1-800-334-8571 ext. 6741

For additional technical information and to obtain EPA's publication regarding sampling and analysis of asbestos entitled "Guidance for Controlling Friable Asbestos-Containing Materials in Buildings" (EPA 560/5-83-002), contact any of EPA's Regional Asbestos Coordinators listed in Appendix B or call EPA's toll-free TSCA hotline:

Continental United States	1-800-424-9065
Washington, DC only	554-1404

2 Quantities and Uses of Asbestos

Asbestos has been mined and used commercially in the U.S. since the early 1900s. U.S. consumption of asbestos increased to a peak of 800,000 tons per year in the early 1970s. Since then, consumption has dropped by more than 70 percent. However, much of the material originally installed in buildings may still be present.

The potential existence of asbestos in commercial products can be assessed first by understanding the physical and chemical characteristics of asbestos-containing products and their uses. This section describes the appearance, composition, friability, use, and market share of the most common asbestos-containing products.

Table 1 summarizes information on these products, many of which are still being manufactured. However, because of the recognized health risk, the manufacture of a few asbestos products has been banned. In addition, the concern of industry for exposure of their workers and the public, and the increased availability of substitute products, has rapidly reduced the use of asbestos.

Friction Products

Asbestos is used in brake linings for automobiles, buses, trucks, railcars, and industrial machinery, and in vehicle or industrial clutch linings. Asbestos-containing brake linings include drum brake linings, disc brake pads, and brake blocks. In the past, asbestos linings have accounted for up to 99 percent of this market. Friction materials are generally tough and nonfriable, but they release asbestos dust during fabrication operations. In addition, accumulated dust in a brake drum from lining wear contains high levels of asbestos. Brake installation facilities (e.g., city bus service centers, tire and brake shops) may generate significant quantities of asbestos waste. Substitute nonasbestos brake linings have been developed and are beginning to replace asbestos lining in some applications.

Plastic Products

Plastic products include resilient vinyl and asphalt floor coverings, asphalt roof coatings, and traditional molded plastic products such as a cooking pot handle or plastic laboratory sink. The products in this category are usually tough and inflexible. The asbestos in these products is tightly bound and is not released under typical conditions of use. However, any sawing, drilling, or sanding of these products during installation or removal would result in the release of asbestos dust.

Table 1. Summary of Asbestos-Containing Products

Product	Average percent asbestos	Binder	Dates used
Friction products	50	Various polymers	1910-present
Plastic products			
Floor tile and sheet	20	PVC, asphalt	1950-present
Coatings and sealants	10	Asphalt	1900-present
Rigid plastics	<50	Phenolic resin	?-present
Cement pipe and sheet	20	Portland cement	1930-present
Paper products			
Roofing felt	15	Asphalt	1910-present
Gaskets	80	Various polymers	?-present
Corrugated paper pipe wrap	80	Starches, sodium silicate	1910-present
Other paper	80	Polymers, starches, silicates	1910-present
Textile products	90	Cotton, wool	1910-present
Insulating and decorative products			
Sprayed coating	50	Portland cement, silicates, organic binders	1935-1978
Trowelled coating	70	Portland cement, silicates	1935-1978
Preformed pipe wrap	50	Magnesium carbonate, calcium silicate	1926-1975
Insulation board	30	Silicates	Unknown
Boiler insulation	10	Magnesium carbonate, calcium silicate	1890-1978
Other uses	<50	Many types	1900-present

Vinyl (linoleum) and asphalt flooring are used in many types of construction. Vinyl-asbestos flooring has about a 90 percent share of the resilient floor covering market. These materials are not friable, and asbestos is released primarily through sawing or sanding operations during installation, remodeling, and removal. Asphalt-asbestos coatings, used primarily as roof sealants, generally remain flexible and nonfriable, but can become friable or brittle as they age.

Cement Pipe and Sheet

Asbestos-cement (A-C) pipe has been widely used for water and sewer mains, and is occasionally used for electrical conduits, drainage pipe, and vent pipes. Asbestos-cement sheet, manufactured in flat or corrugated panels and shingles, has been used primarily for roofing and siding, but also for cooling tower fill sheets, canal bulkheads, laboratory tables, and electrical switching gear panels. Asbestos-cement products are dense and rigid with gray coloration, unless the material is lined or coated. The asbestos in these products is tightly bound, and would not be released to the air under typical conditions of use. However, any sawing, drilling, or sanding of these products during installation or renovation would result in release of asbestos dust. In addition, the normal breakage and crushing involved in the demolition of structures can release asbestos fibers from these materials. For this reason they are subject to the NESHAPs regulation during demolition operations. Also, normal use of A-C pipe for water or sewer mains has been shown to release asbestos fibers to the fluid being carried.

By the late 1970s, A-C pipe had a 40 percent share of the water main market and a 10 percent share of the sewer main market. However, since A-C pipe has only been in existence for 50 years, it only accounts for a small fraction of the total pipe in place in the United States.

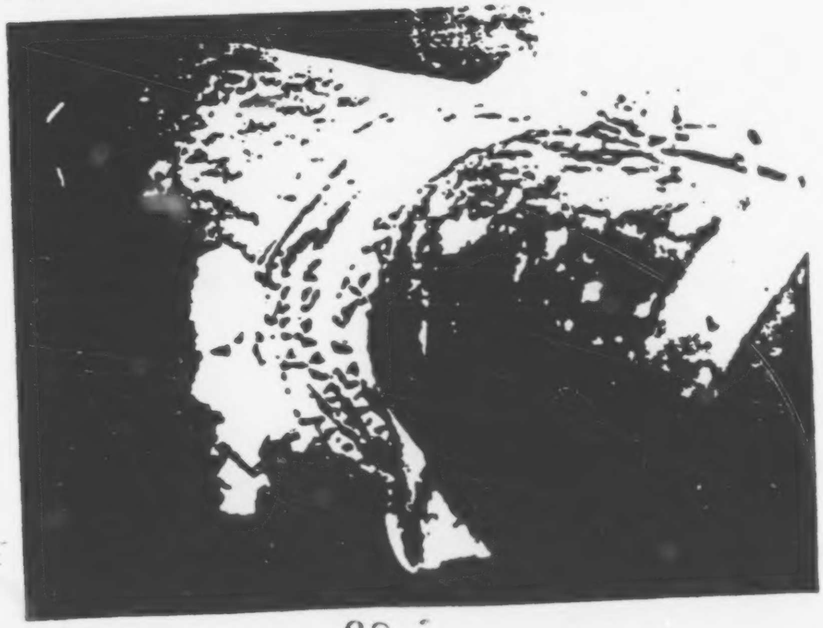
Paper Products

Roofing felts, gaskets, and other paper products are manufactured on conventional papermaking equipment using asbestos fibers instead of cellulose. The raw asbestos paper produced in this process has a high asbestos content (~85 percent), but is typically coated or laminated with other materials in the final product. The asbestos fibers in most paper products are sufficiently bound to prevent their release during normal product use. Cutting or tearing the material during installation, use, or removal would result in the release of asbestos dust.

Asbestos-containing roofing felt has been widely used for application of "built-up" roofs. Built-up roofing is used on a flat surface, and consists of alternating layers of roofing felt and asphalt. The roofing felt consists of asbestos paper, saturated and coated with asphalt. Asphalt-asbestos roofing shingles for residential structures, made from roofing felt coated with asphalt, were reportedly used for only a short time between 1971 and 1974.

Other asbestos-containing paper products include pipeline wrap, millboard, rollboard, commercial insulating papers, and a variety of specialty papers. Pipeline wrap is used to protect underground pipes from corrosion, particularly in the oil and gas industry. Millboard and rollboard are laminated paper products used in commercial construction such as walls and ceilings. Commercial insulating papers are used for high temperature applications in the metals

Figure 3. Corrugated asbestos paper pipe wrap.



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and ceramics industries, for low-grade electrical insulation, and for fireproofing steel decks in building construction. Corrugated asbestos paper was used for pipe coverings (illustrated in Figure 3), block insulation, and specialty panel insulation. Although these uses have generally been discontinued, significant amounts are typically found in older structures. These products are generally considered friable.

Textile Products

Asbestos yarn, cloth, and other textiles are made using conventional textile manufacturing equipment. These materials are used to manufacture fire-resistant curtains or blankets, protective clothing, electrical insulation, thermal insulation, and packing seals. The raw textile products have a high asbestos content (~85 percent). However, they are typically coated or impregnated with polymers before assembly into a final product, which is not required to be labeled as containing asbestos and typically is not so labeled. These products may release asbestos dust if cut or torn, or for some products, during normal use. There still remains a significant quantity of non-coated fabrics in use, especially in schools and fire departments.

Insulating and Decorative Products

Asbestos-containing thermal insulation generally refers to sprayed and trowelled asbestos coatings, and molded or wet-applied pipe coverings. These materials generally have an asbestos content of 50 to 80 percent. The coatings were commonly applied to steel I-beams and decks (illustrated in Figure 4), concrete

Figure 4. Asbestos spray insulation on an I-beam and steel deck.

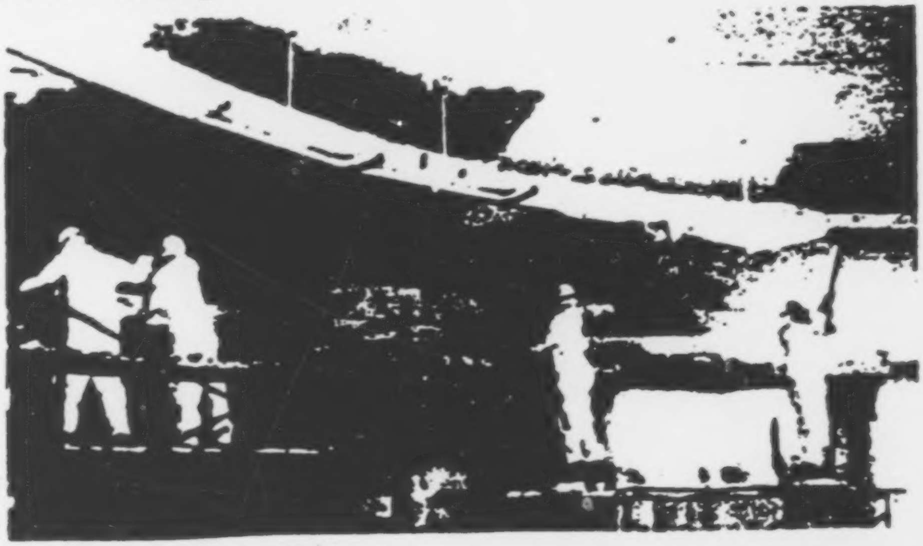
ceilings and walls (illustrated in Figure 5), and hot water tanks and boilers. The coatings were applied primarily for thermal insulation, although in many cases the coating also provided acoustical insulation and a decorative finish. Sprayed coatings typically have a rough, fluffy appearance, while trowelled coatings have a smooth finish and may be covered with a layer of plaster or other nonasbestos material. Both sprayed and trowelled asbestos coatings are considered friable in most applications. Most spray-applied asbestos coatings were banned for fireproofing/insulating in 1973, and for decorative purposes in 1978.

Asbestos insulation board was used as a thermal/fireproofing barrier in many types of walls, ceilings, and ducts or pipe enclosures. This material looks like A-C sheet, but is less dense and much more friable. High asbestos dust levels have been measured for many board handling operations, including simple unloading of uncut sheets.

Pipe Insulation

Preformed pipe coverings having an asbestos content of about 50 percent were used for thermal insulation on steam pipes in industrial, commercial, institutional, and residential applications. This product is usually white and chalky in appearance and was typically manufactured in 3-foot long, half-round sections, joined around the pipe using plaster-saturated canvas or metal bands. Typical examples of preformed pipe insulation are illustrated

Figure 5. Sprayed asbestos-containing materials being removed from a concrete ceiling.



in Figures 6 and 7. This covering was applied on straight pipe sections, while wet-applied coatings were used on elbows, flanges, and other irregular surfaces. The preformed pipe coverings may be slightly more dense than the insulating coatings, but are still very friable. The installation of wet-applied and preformed asbestos insulations were banned in 1975, however, significant amounts are typically found in older structures.

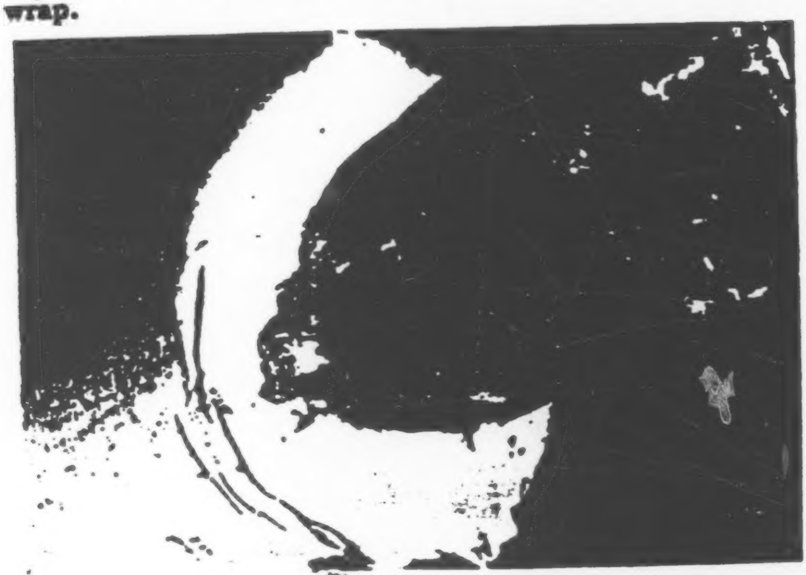
Boilers and Hot Water Tanks

Preformed block insulation was used as thermal insulation on boilers, hot water tanks, and heat exchangers (illustrated in Figure 8) in industrial, commercial, institutional, and residential applications. These blocks are commonly chalky white, 2 inches thick, from 1 to 3 feet in length and held in place around the boiler by metal wires and/or expanded metal lath. A plaster-saturated canvas was often utilized as a final covering or wrap. Asbestos block insulation is friable and rapidly deteriorates in a high humidity environment or when exposed to water. The installation of this type of asbestos insulation was banned by EPA in 1975.

Other Uses

Other uses of asbestos have included: exterior siding shingles, shotgun shell base wads, asphalt paving mix, spackle and joint patching compounds, artificial fireplace logs for gas-burning fireplaces, and artificial snow. The use of asbestos as artificial logs in

Figure 6. Preformed asbestos pipe insulation with canvas wrap.



gas-burning fireplace systems was banned in 1977, while the use of asbestos as an ingredient in spackle and joint compounds was banned in 1978. Asbestos is still used in oil/gas drilling fluids, added at a concentration of approximately 1 percent.

Figure 7. Preformed block insulation with canvas wrap on a pipe.

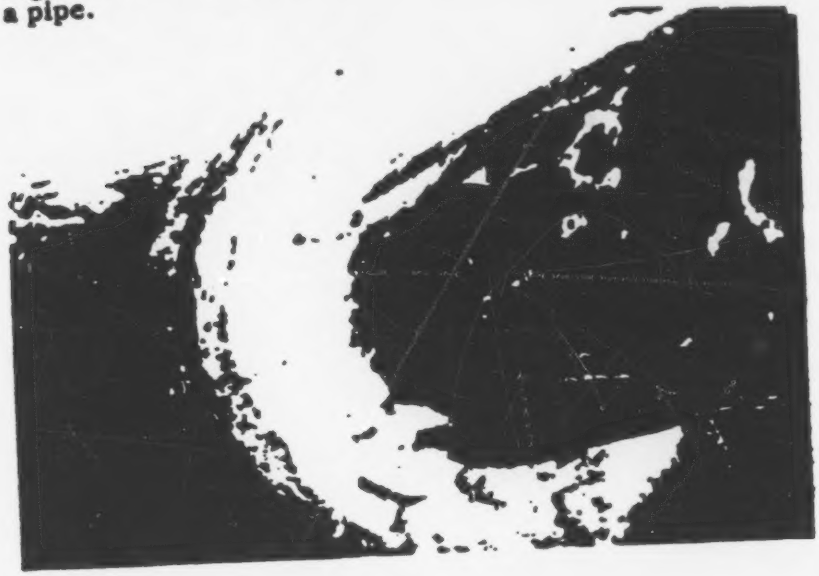
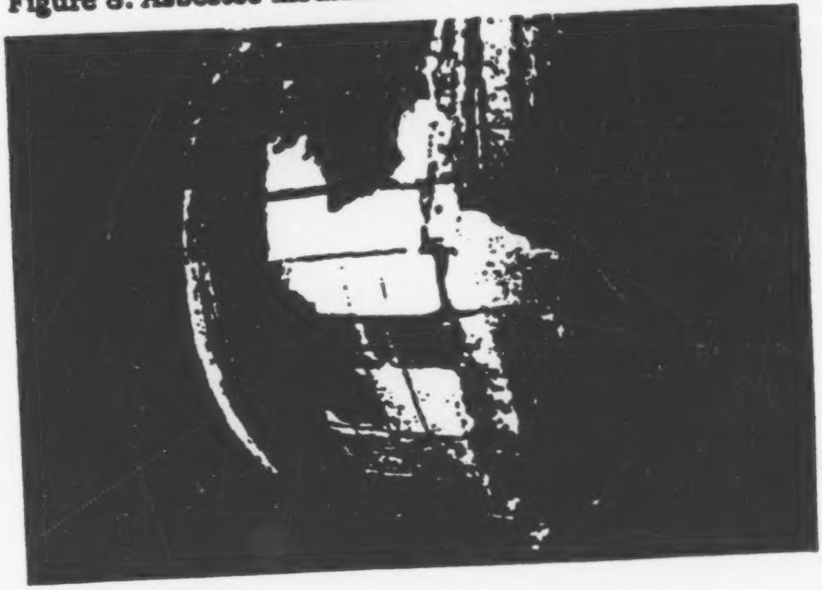


Figure 8. Asbestos insulation on a heat exchanger.



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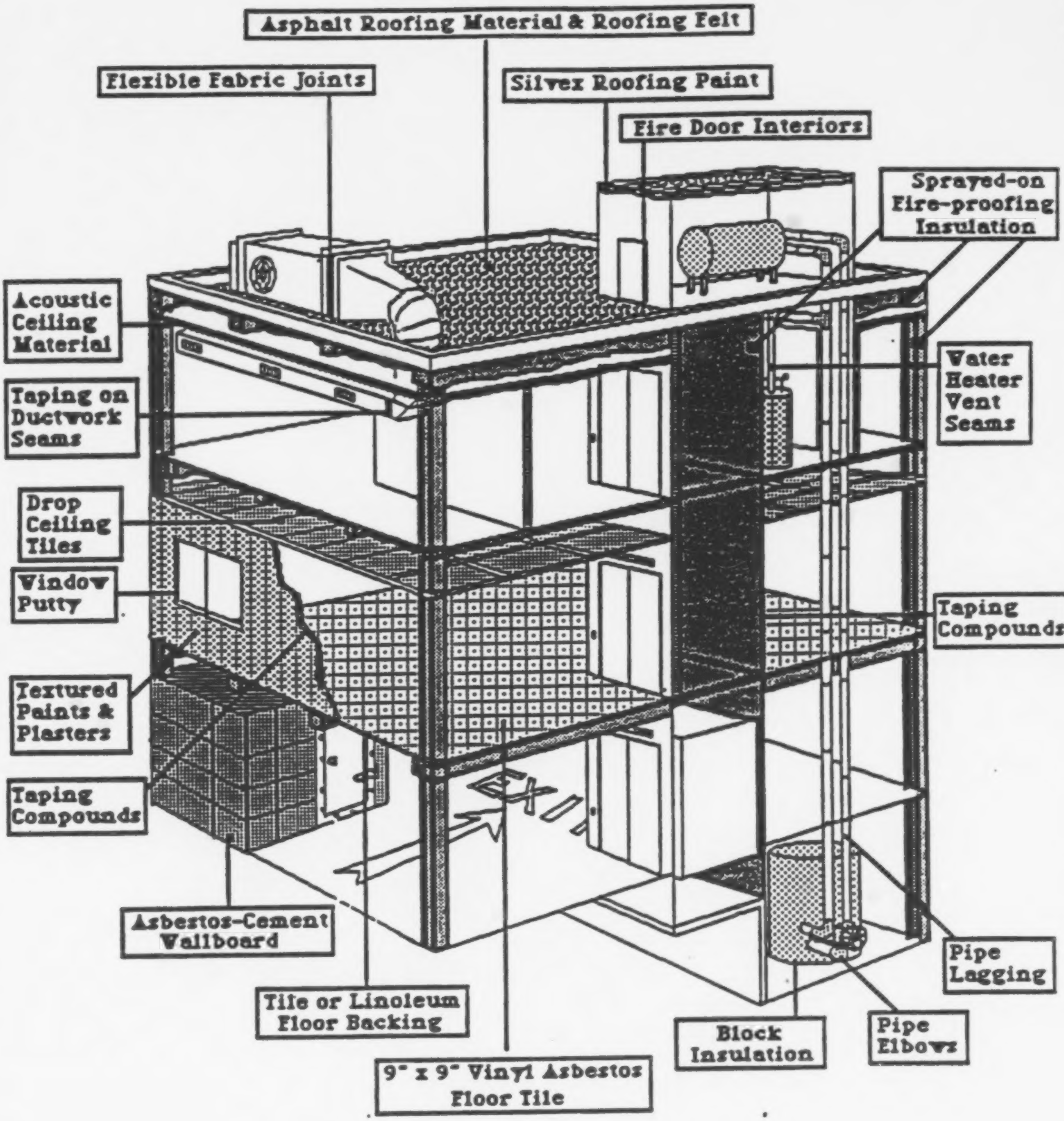
Asbestos Containing Materials in Buildings


Asphalt Roofing Material & Roofing Felt
Flexible Fabric Joints
Silvex Roofing Paint
Fire Door Interiors
Sprayed-on Fire-proofing Insulation
Acoustic Ceiling Material
Taping on Ductwork Seams
Water Heater Vent Seams
Drop Ceiling Tiles
Window Putty
Taping Compounds
Textured Paints & Plasters
Taping Compounds
EXIT
Asbestos-Cement Wallboard
Pipe Lagging
Tile or Linoleum Floor Backing
Block Insulation
Pipe Elbows
9" x 9" Vinyl Asbestos Floor Tile

Pacific Asbestos Information Center, University Extension

University of California, Berkeley

Appendix A. Asbestos-Containing Materials Found in Buildings*

Subdivision	Generic name	Asbestos (%)	Dates of use	Binder/sizing
Surfacing material	sprayed- or troweled-on	1-95	1935-1970	sodium silicate, portland cement, organic binders.
Preformed thermal insulating products	batts, blocks, and pipe covering			
	85% magnesia	15	1926-1949	magnesium carbonate
	calcium silicate	6-8	1949-1971	calcium silicate
Textiles	cloth[a]			
	blankets (fire)[a]	100	1910-present	none
	felts:	90-95	1920-present	cotton/wool
	blue stripe	80	1920-present	cotton
	red stripe	90	1920-present	cotton
	green stripe	95	1920-present	cotton
	sheets	50-95	1920-present	cotton/wool
	cord/rope/yarn[a]	80-100	1920-present	cotton/wool
	tubing	80-85	1920-present	cotton/wool
	tape/strip	90	1920-present	cotton/wool
	curtains[a] (theatre, welding)	60-65	1945-present	cotton
Cementitious concrete-like products	extrusion panels:	8	1965-1977	portland cement
	corrugated	20-45	1930-present	portland cement
	flat	40-50	1930-present	portland cement
	flexible	30-50	1930-present	portland cement
	flexible perforated	30-50	1930-present	portland cement
	laminated (outer surface)	35-50	1930-present	portland cement
	roof tiles	20-30	1930-present	portland cement
	clapboard and shingles:			
	clapboard	12-15	1944-1945	portland cement
	siding shingles	12-14	unknown-present	portland cement
	roofing shingles	20-32	unknown-present	protland cement
	pipe	20-15	1935-present	portland cement
Paper products	corrugated:			
	high temperature	90	1935-present	sodium silicate
	moderate temperature	35-70	1910-present	starch
	indented	98	1935-present	cotton and organic binder
	millboard	80-85	1925-present	starch, lime, clay
Roofing felts	smooth surface	10-15	1910-present	asphalt
	mineral surface	10-15	1910-present	asphalt
	shingles	1	1971-1974	asphalt
	pipeline	10	1920-present	asphalt

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* The information in this Appendix is taken, with modification, from: Lory EE, Coin DC. February 1981. *Management Procedure for Assessment of Friable Asbestos Insulating Material*. Port Hueneme, CA: Civil Engineering Laboratory Naval Construction Battalion Center. The U.S. Navy prohibits the use of asbestos-containing materials when acceptable nonasbestos substitutes have been identified.

[a] Laboratory aprons, gloves, cord, rope, fire blankets, and curtains may be common in schools.

Appendix A. (continued)

Subdivision	Generic name	Asbestos (%)	Dates of use	Binder/sizing
Asbestos-containing compounds	caulking putties	30	1930-present	linseed oil
	adhesive (cold applied)	5-25	1945-present	asphalt
	joint compound		1945-1975	asphalt
	roofing asphalt	5	unknown-present	asphalt
	mastics	5-25	1920-present	asphalt
	asphalt tile cement	13-25	1959-present	asphalt
	roof putty	10-25	unknown-present	asphalt
	plaster/stucco	2-10	unknown-present	portland cement
	spackles	3-5	1930-1975	starch, casein, synthetic resins
	sealants fire/water	50-55	1935-present	caster oil or polyisobutylene
	cement, insulation	20-100	1900-1973	clay
	cement, finishing	55	1920-1973	clay
	cement, magnesia	15	1926-1950	magnesium carbonate
Asbestos ebony products		50	1930-present	portland cement
Flooring tile and Sheet Goods	vinyl/asbestos tile	21	1950-present	poly(vinyl)chloride
	asphalt/asbestos tile	26-33	1920-present	asphalt
	sheet goods/resilient	30	1950-present	dry oils
Wallcovering	vinyl wallpaper	6-8	unknown-present	—
Paints and coatings	roof coating	4-7	1900-present	asphalt
	air tight	15	1940-present	asphalt

SUBSTITUTE MATERIALS FOR ASBESTOS-CONTAINING MATERIALS

I. Pipe Insulation
II. Sprayed-On Materials
III. Wallboards/Panels
IV. Fabric/Textiles
V. Cements/Plastics
VI. Brake Lining/Disc Pads
VII. Packing/Filler Materials
VIII. Gasket Materials

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GTRI/EDL/EHSD
Atlanta, Georgia
June 1986

I. SUBSTITUTE MATERIALS FOR ASBESTOS PIPE INSULATION

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	Aerotube	Johns-Manville	Foamed Plastic
2.	Alpha-Maritex Style 1925	Alpha Associates	Fibrous Glass
3.	Alpha-Maritex #3111-RW	Alpha Associates	Fibrous Glass
4.	Armaflex 22	Armstrong Cork Co.	Foamed Plastic
5.	CPR	Upjohn	Plastic
6.	Crown	Fiberglas, Ltd.	Fibrous Glass
7.	Fit-Rite	Fibrous Glass Products, Inc.	Fibrous Glass
8.	Flame-Safe	Johns-Manville	Fibrous Glass
9.	Glo-Brite	Glo-Brite Products	Poly Foam
10.	GPC	Johns-Manville	Fibrous Glass
11.	Hewflex	H.E. Werner, Inc.	Polyurethane Foam
12.	Kaowool	Babcock & Wilcox	Ceramic Fiber
13.	Kaylo 10	Owens Corning Fiberglass	Fibrous Glass
14.	Micro-Lok 650	Johns-Manville	Fibrous Glass
15.	Pabco Super Caltemp Type NA	Fibreboard Corp.	Diatomaceous Earth, Non-Asbestos Fiber, Lime
16.	PF-CG	Owens-Corning Fiberglass	Fibrous Glass
17.	PMF	Jim Walter Resources, Inc.	Fibrous Glass
18.	Ruberoid Fiber Glass Pipe Insulation	Ruberoid	Fibrous Glass
19.	Snap-On	CertainTeed	Fibrous Glass
20.	TGA-1000	Alpha Associates	Tedlar and Glass Fiber
21.	Therma-K	Ehret Magnesia Mfg. Co.	Glass Fiber
22.	Thermashield	Tecknit	Ceramic Fiber
23.	Transifoam	Johns-Manville	Polystyrene
24.	Transitop	Johns-Manville	Wood Fiber
25.	Uni-Jac	Pittsburgh Corning	Glass Fabric
26.	Vapo-Lok	MMM Div. Insular Prods. Corp.	Expanded Polystyrene
27.	VB-Vapor Barrier	Johns-Manville	Kraft Paper with Glass Fiber
28.	VBL-Vapor Barrier	Johns-Manville	Fibrous Glass
29.	VL	Riva and Mariani	Cellular Glass
30.	Z-Lock	Fibreglas Ltd.	Fibrous Glass
31.	Zonolite	W.R. Grace and Co.	Vermiculite

II. SUBSTITUTE MATERIALS FOR SPRAYED-ON ASBESTOS INSULATION

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	Cafco	USM	Mineral Fibers
2.	Cafcote H	USM	Mineral Fibers (also abrasion resistant)
3.	Ceramafiber	USM	Ceramic Fiber
4.	Ceramospray	Spraycraft Corp.	Ceramic Fiber
5.	Ceramwool	Johns-Manville	Ceramic Fiber
6.	Encagel V	Childers Products Co.	Urethane
7.	Ensolite	U.S. Rubber Co.	Polyvinyl Chloride
8.	Ensolite Type M	U.S. Rubber Co.	Polyvinyl Chloride
9.	K-13	National Cellulose Corp.	Cellulose

III. SUBSTITUTE MATERIALS FOR ASBESTOS-CONTAINING PANELS OR WALLBOARDS

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	Bestwall	Georgia Pacific	Gypsum
2.	Cal-Shake	U.S. Gypsum	Calcium Silicate
3.	Careytemp 1500	Celotex	Expanded Perlite
4.	Cellofoam	USM	Polystyrene
5.	Cellutron	Owens Corning	Cellulose
6.	Celot-Therm	Celotex	Perlite
7.	Ceramfab	USM	Ceramic Fiber
8.	Delta-T	Keene Corp.	Ceramic Fiber
9.	Doraspan	Dow	Ceramic Fiber
10.	Dylite	Sinclair-Koppers	Molded Foam
11.	Econacoustic	Sinclair-Koppers	Wood Fiber
12.	Filomat-D	Alpha Associates	Glass Fiber
13.	Fire Stop	Cotton, Inc.	Treated Cotton
14.	Firetard Type X	Johns-Manville	Gypsum
15.	Foamgrid	USM	Polystyrene Foam
16.	Foamsil-28	Pittsburgh Corning	Glass Foam
17.	Foamthane	Pittsburgh Corning	Polyurethane Foam
18.	SE Armalite	Armstrong Cork Co.	Polystyrene
19.	Styrofoam	Dow	EPDM and Aramid
20.	Watertite Backer	Johns-Manville	Gypsum

IV. SUBSTITUTE MATERIALS FOR ASBESTOS-CONTAINING FABRICS

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	Alpha-Maritex 03111-RW	Alpha Associates	Glass Fiber
2.	Alpha-Maritex 084205	Alpha Associates	Glass Fiber
3.	Aramid	DuPont	Synthetic
4.	Ceel-Tite	Ceel-Co	ABS Plastic
5.	Cerafelt	Johns-Manville	Ceramic Fiber
6.	Ceramfab	USM	Ceramic Fiber
7.	Fiberfrax	The Carborundum Co.	Ceramic Fiber
8.	Fiberseal	Pyrotek, Inc.	Glass Fiber
9.	Fire Stop	Cotton, Inc.	Treated Cotton
10.	Flexfelt	General Insulating	Rock Wool
11.	Flextra	Raybestos-Manhattan	Cotton/Aramid
12.	Fyrepol	Fyrepel	Glass Fiber
13.	Glas Ply	Johns-Manville	Glass Fiber
14.	Glassbestos	Raybestos-Manhattan	Glass Fiber
15.	Glass Web	Steiner Industries	Glass Fiber
16.	GVB Glass/Cloth Vapor Barrier	Johns-Manville	Glass Fiber
17.	Hansoquilt	Baldwin-Ehret-Hill	Glass Fiber
18.	Insulfas	Benjamin Foster	Glass
19.	Kynol	American Kynol Corp.	Novoloid Fiber
20.	Nomex	DuPont	Synthetic
21.	Nor-Fab	Hitco (Armco)	Synthetic
22.	Nor-Fab	AMATEX Corp.	Synthetic
23.	Preox	Gentex Corp.	Heat-Stabilized Polyacrylonitrile
24.	Pyroglas	Raybestos-Manhattan	Glass Fiber

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
25.	SF 2600	Santa Fe Textiles, Inc.	Ceramic Fiber
26.	Sisalkraft	St. Regis Paper Co.	Kraft Paper/Aluminum
27.	Snap Form	CertainTeed	Polyvinyl Chloride
28.	Tempo	Tempo Glove Manufacturing, Inc.	Glass Fiber or Leather
29.	Terrybest	A-Best	Kevlar 29
30.	Thermafiber	U.S. Gypsum	Perlite
31.	Thermobest	A-Best Co.	Kevlar and other synthetics
32.	Thermo-Ceram	Garlock, Inc.	Ceramic Fiber
33.	Thermoglass	Amatex Corp.	Glass Fibers
34.	Thermo-Sil	Garlock, Inc.	Glass Fibers
35.	Zonolite Dyfoam	W.R. Grace and Co.	Polystyrene

V. SUBSTITUTE MATERIALS FOR ASBESTOS-CONTAINING CEMENTS/PLASTERS

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	Alumino-Hi-Temp	Carey	Alumina
2.	Careytemp 1500	Celotex	Expanded Perlite
3.	Cem-Fil	Asahi Glass Co. Ltd.	Glass Fiber
4.	Cerablanket	Johns-Manville	Ceramic Fiber
5.	Cerachrome	Johns-Manville	Ceramic Fiber
6.	Epitherm 1200	Eagle-Picher	Polyvinyl Chloride
7.	Feldina	Nonco Corp.	Non-Asbestos Mineral
8.	Fesco Board	Johns-Manville	Perlite
9.	Mono-Block	Keene Corp.	Mineral Wool
10.	MW-One Insulating Cement	Celotex	Mineral Wool
11.	MW-50	Celotex	Mineral Wool
12.	Nonpariel	Armstrong Cork Co.	Rock Wool
13.	Pabco No. 127	Fibreboard Corp.	Mineral Wool
14.	Pabco Super Caltemp Type NA	Fibreboard Corp.	Diatomaceous Earth, Mineral Fibers, Lime
15.	Super 1900	Keene Corp.	Mineral Wool

VI. SUBSTITUTE MATERIALS FOR ASBESTOS-CONTAINING BRAKE LINING OR DISCS

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	Aramid	DuPont	Synthetic
2.	Kynol	American Kynol Corp.	Novoloid Fiber
3.	Metal-Might	Lear Siegler, Inc.	Metallic Fiber
4.	Premium	Euclid Industries	Synthetic
5.	Scan-Pac	Scan-Pac	Metal Chips
6.	Star Line	Abex Corp.	Glass Fiber

VII. SUBSTITUTES FOR ASBESTOS-CONTAINING PACKING OR FILLERS

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	CA-5	U.S. Gypsum	Calcium Silicate
2.	Garfite	Garlock, Inc.	Graphite
3.	GFO Fiber	W.L. Gore and Associates, Inc.	PTFE and Graphite
4.	Navalon	Johns-Manville	Ramie
5.	Parfab	Parker Seals	Synthetic
6.	Partherm	Parker Seals	Glass Fiber
7.	Processed Mineral Fiber	Jim Walter Resources, Inc.	Glass Fiber
8.	Snow White	U.S. Gypsum	Calcium Sulfate
9.	Spandreline	PPG	Ceramic Fiber
10.	Spandrelite	PPG	Glass Fiber
11.	Spinsulation	Johns-Manville	Glass Fiber
12.	Style 50-50	Garlock, Inc.	EPDM and Aramid
13.	Synethepak	Garlock, Inc.	Polymer Fiber
14.	Technifoam	Celotex	Urethane

VIII. SUBSTITUTES FOR ASBESTOS-CONTAINING GASKETS

	TRADE NAME	MANUFACTURER	SUBSTITUTE MATERIAL
1.	Aramid	DuPont	Synthetic
2.	Blue-Gard	Garlock, Inc.	Styrene Foam
3.	Chevron	Garlock, Inc.	Fibrous Glass
4.	Fil-Tec	Fil-Tec	Glass Fiber
5.	Garthane	Garlock, Inc.	Graphite
6.	Gylon	Garlock, Inc.	Glass Fiber
7.	Kynol	American Kynol Corp.	Novoloid Fiber
8.	Marblock	Garlock, Inc.	Glass Wool
9.	Nobestos	Rogers Corp.	Chloroprene, Nitrile, or Acrylic
10.	Prolene	Garlock, Inc.	EPDM Rubber
11.	Temp Mat	Pittsburgh Corning	Glass Fiber
12.	Texo	PPG	Fiber Glass

REFERENCES

1. Sourcebook on Asbestos Diseases: Medical, Legal, and Engineering Aspects, Volume 2. George A. Peters and Barbara J. Peters. Garland Law Publishing, New York 1986.

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Section 3: Health Effects of Asbestos Exposure

Section objectives: information in this section will allow the participants to:

1. Gain an understanding of the ways asbestos fibers can enter the body.
2. Be able to recognize the major diseases associated with asbestos exposure.
3. Explain the "dose-response" affect and how this concept relates to the occurrence of asbestos related diseases.
4. Understand the relationship between smoking and asbestos exposure, and the increased risk of disease. (Synergistic Relationship)
5. Understand the length of time, or latency period, following the exposure to asbestos fibers before the onset of disease may occur.
6. Recognize the difference between recommended exposure limits and an absolutely safe exposure level of asbestos fibers.

Section 3: Health Effects of Asbestos Exposure

1. Methods or ways materials can enter the body

   Digestive system

   Skin

   Respiratory system

2. Respiratory system: breathing asbestos fibers

   Trachea and Bronchi

   Alveoli

   Lung or Pleural cavity

   Mesothelial lining

   Lung

   Peritoneum

3. Effects of asbestos fibers in the aveoli

   Macrophage

4. Diseases associated With asbestos

Asbestosis

Mesothelioma

Lung Cancer

Other Cancers

5. Asbestos exposure dose-reponse effect

Exposure level in the workplace

Risk of disease

6. Relationship between asbestos exposure and smoking

People who smoke 20 cigarettes a day

Asbestos workers who do not smoke

Asbestos workers who smoke 20 cigarettes a day

The synergistic effect

7. Latency period for asbestos disease development

   Average time for disease development

8. Recommended asbestos exposure limits

   Permissible Exposure Limit (PEL)

   Action Level for asbestos fibers

   Is there a safe level for asbestos fiber exposure?

Health Concerns Related to Inhalation

Medical studies of asbestos-related diseases have revealed that the primary exposure route is inhalation. Also, the studies suggest that there does not appear to be a safe level of exposure (e.g., a threshold) below which there would be no chance of disease. The exposure may be classified as "occupational exposure" of workers involved, for example, in mining, milling, manufacturing, fabricating, construction, spraying, or demolition activities; "paraoccupational exposure" of workers' families due to asbestos on work clothes taken home; or "neighborhood exposure" of people living or working near such operations. The following diseases can result from inhalation of airborne asbestos fibers:

Asbestosis—A noncancerous respiratory disease that consists of scarring of lung tissues. Symptoms of asbestosis include shortness of breath and rales, a dry crackling sound in the lungs during inhalation. Advanced asbestosis may produce cardiac failure and death. Asbestosis is rarely caused by neighborhood exposure.

Lung Cancer—Inhaled asbestos particles can produce lung cancer independent of the onset of asbestosis. In most lung cancer patients, a cough or a change in cough habit is found. A persistent chest pain unrelated to coughing is the second most common symptom.

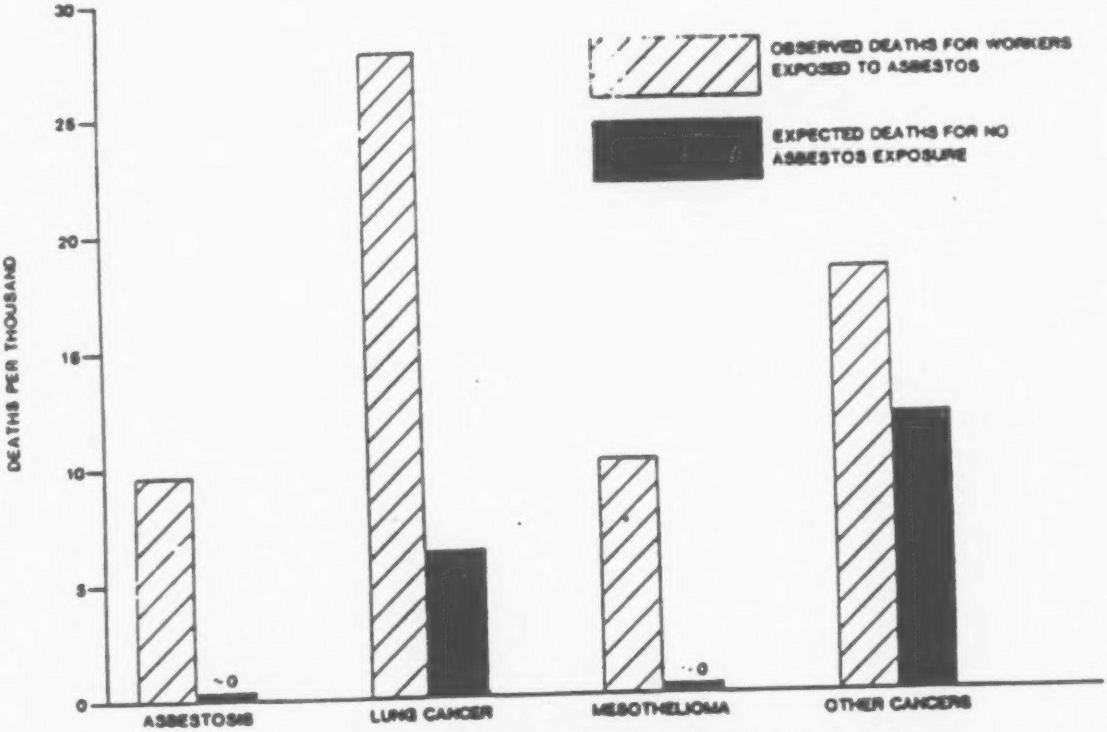
Mesothelioma—This is a rare cancer of the thin membrane lining of the chest and abdomen. Most incidences of mesothelioma have been traced directly to a history of asbestos exposure. The earlier in life that one begins inhaling asbestos, the higher the likelihood of developing mesothelioma in later life. Thus, there is concern over exposure of school children to asbestos. The common symptoms are shortness of breath, pain in the walls of the chest, or abdominal pain. Mesothelioma is always fatal.

Other Cancers—Some medical studies have suggested that exposure to asbestos is responsible for some cancers of internal organs including the esophagus, larynx, oral cavity, stomach, colon, and kidney. It is theorized that inhaled asbestos fibers are absorbed into the blood stream and carried to these other parts of the body.

Symptoms of asbestos respiratory disease generally do not appear for 20 or more years after the initial exposure to airborne asbestos. However, early disease detection is possible by a medical examination including a medical history, breathing capacity tests, and a chest x-ray.

Most health risk data pertain to groups of asbestos workers with relatively high exposures. A study of mortality for 17,500 asbestos insulation workers is summarized in Figure 2. The study compares death rates among insulation workers exposed to asbestos and other workers not exposed to asbestos. Based on this and other studies, the National Institute for Occupational Safety and Health (NIOSH) has reported that persons exposed to asbestos may have 5 times the chance of developing an asbestos- related disease, compared to similar nonexposed persons.

Figure 2. Expected and observed mortality among asbestos insulation workers.



Source: ASTM 834. PCN 04- 834000-17. July 1984.

Studies have shown that exposure to asbestos and cigarette smoking combine to create a significantly higher risk of developing an asbestos-related disease. Statistics compiled by NIOSH indicate that a smoker exposed to asbestos may have 50 times the chance of developing lung cancer compared to a nonexposed nonsmoker. Some information suggests that quitting smoking can reduce this high risk.

Health Concerns from Ingestion and Contact with Skin

There have been no conclusive studies to date indicating that ingestion of asbestos in food or water may result in health hazards. However, because of concern that there may be potential health impacts not yet identified, there are federal regulations specifying asbestos limitations in ambient water and in products such as food processing filters.

With regard to asbestos contact with the skin, there is currently no evidence to indicate that asbestos fibers can penetrate the skin tissue. Some workers have indicated that asbestos fibers irritate the skin resulting in a rash similar to that experienced with handling of other fibrous materials such as fiberglass insulation.

Federal Regulatory Programs

EPA and OSHA have major responsibility for regulatory control over exposure to asbestos. Emissions of asbestos to the ambient air are controlled under Section 112 of the Clean Air Act, which establishes the National Emission Standards for Hazardous Air Pollutants (NESHAPs). The regulations specify control requirements for most asbestos emissions, including work practices to be followed to minimize the release of asbestos fibers during handling of asbestos waste materials. These regulations do not identify a safe threshold level for airborne asbestos fibers. For additional information about the NESHAPs regulations for asbestos, refer to the Code of Federal Regulations (40 CFR Part 61, Subpart M).

The OSHA regulations are established to protect workers handling asbestos or asbestos-containing products. The current OSHA regulations include a maximum workplace airborne asbestos concentration limit of 2 fibers/cc on an 8-hour time weighted average basis, and a ceiling limit of 10 fibers/cc in any 15-minute period. The standard includes requirements for respiratory protection and other safety equipment, and work practices to reduce indoor dust levels. For details regarding the OSHA regulations, refer to the Code of Federal Regulations (29 CFR Part 1910).

EPA has implemented a separate regulation under the Toxic Substances Control Act (TSCA) to handle the problem of asbestos construction materials used in schools. This regulation requires that all schools be inspected to determine the presence and quantity of asbestos and that the local community be notified as well as the building posted. Corrective actions, such as asbestos removal or encapsulation, are currently left to the discretion of the school administrators. EPA provides technical assistance under this program through the Appendix B contacts or the toll-free TSCA hotline: 1-800-424-9065 (554-1404 in Washington, DC). The specific details of the TSCA program are contained in the Code of Federal Regulations (40 CFR Part 763, Subpart F).

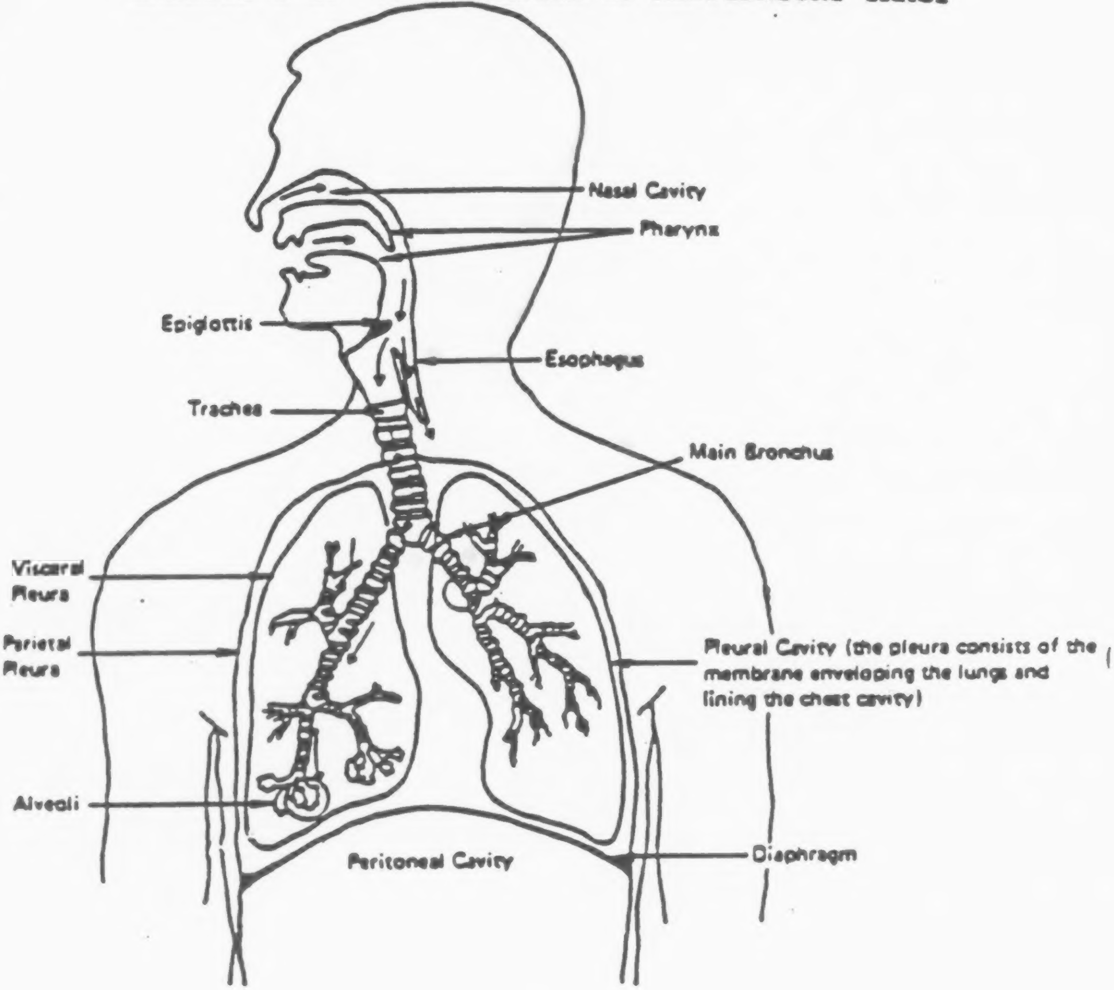
The Asbestos School Hazard Abatement Act of 1984 (ASHAA) establishes a $600 million grant and loan program to assist financially needy schools with asbestos abatement projects. The program also includes the compilation and distribution of information concerning asbestos, and the establishment of standards for abatement projects and abatement contractors. Under this program, centers to train contractors on asbestos handling and abatement have been established at the Georgia Institute of Technology, Atlanta, GA, and are scheduled to open in June 1985 at both Tufts University, Medford, MA, and at the University of Kansas, Lawrence, KN. Additional information can be obtained through the toll-free ASHAA hotline: 1-800-835-6700 (554-1404 in Washington, DC).

Wastes containing asbestos are not hazardous wastes under the Resource Conservation and Recovery Act (RCRA). However, because state regulations can be more restrictive than the federal regulations under RCRA, some states may have listed asbestos-containing wastes as hazardous wastes. Since this will greatly impact on transportation and disposal of the waste, the state hazardous waste agency should be contacted. A list of state hazardous waste agencies may be obtained by calling the RCRA hotline: 1-800-424-9346 (382-3000 in Washington, DC). Current nonhazardous waste regulations under RCRA pertain to facility siting and general operation of disposal sites (including those that handle asbestos). Details concerning these RCRA requirements are contained in the Code of Federal Regulations (40 CFR Part 257).

Other federal authorities and Agencies controlling asbestos include: the Clean Water Act, under which EPA has set standards for asbestos levels in effluents to navigable waters; the Mine Safety and Health Administration, which oversees the safety of workers involved in the mining of asbestos; the Consumer Product Safety Commission; the Food and Drug Administration; and the Department of Transportation.

State and local agencies may have more stringent standards than the federal requirements; these agencies should be contacted prior to any asbestos removal or disposal operation.

EXHIBIT B-1: ILLUSTRATION OF RESPIRATORY TRACT


Nasal Cavity
Pharynx
Epiglottis
Esophagus
Trachea
Main Bronchus
Visceral Pleura
Parietal Pleura
Pleural Cavity (the pleura consists of the membrane enveloping the lungs and lining the chest cavity)
Alveoli
Peritoneal Cavity
Diaphragm

Routes of inhalation and ingestion of asbestiform fibers are shown by small arrows. Mesothelial cells line the outside of the lungs and the pleural and peritoneal cavities. Interaction of asbestos with these cells can result in either pleural or peritoneal mesothelioma. Adapted from Wagner, 1980.*

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*Figure from Asbestiform Fibers, Nonoccupational Health Risks. National Research Council, National Academy Press, Washington, DC (1984), p. 101.

Section 4: State and Federal Asbestos Laws

Section objectives: information in this section will allow the participants to:

1. Identify the federal agencies involved in asbestos regulations and enforcements.
2. Recognize the following federal laws that affect the handling of asbestos:
   a) Occupational Safety and Health Act (OSHA)
   b) National Emissions Standards for Hazardous Air Pollutants (NESHAPS)
   c) Asbestos Hazard Emergency Response Act (AHERA)
3. Understand the major requirements of these federal regulations that affect the handling of asbestos.
4. Identify the state agencies involved in asbestos regulations and enforcements.
5. Recognize the following State of Oregon laws that affect the handling of asbestos:
   a) Hazardous Air Contaminant Rules for Asbestos, OAR 340
      Division 25: emission standard and procedural requirements for hazardous air contaminants
      Division 33: licensing and certification requirements

   b) Oregon Occupational Safety and Health Code; OAR 437
      Division 83: construction standards for asbestos
      Division 129: protective equipment, apparel, and respirators
      Division 153: pipe labelling
6. Understand the major requirements of these state regulations that affect the handling of asbestos.
7. Understand the regulations, definitions, and limitations that describe the small-scale/ short-duration asbestos abatement project and the small-scale worker.
8. Identify any local or regional air pollution control authorities that would have regulations covering handling of asbestos.

Section 4: State and Federal Asbestos Laws

1. Federal Regulatory Agencies

Department of Labor

OSHA

NIOSH

Environmental Protection Agency

NESHAPS

Worker Protection Rule

AHERA

Other Federal Agencies

Department Of Transportation (DOT)

National Bureau of Standards

Consumer Product Safety Commission

2. State of Oregon regulatory agencies

Department of Environmental Quality

OAR 340-25: Hazardous Air Contaminant Rules for Asbestos

OAR 340-33: Licensing and Certification

Accident Prevention Division

OAR 437-83: Construction Standards for Asbestos

OAR 437-129: Protective Equipment, Apparel, and Respirators

OAR 437-153: Pipe Labelling

3. Local or regional air pollution control authority

4. Small-Scale, Short Duration Activities

a) removal of asbestos containing insulation on pipes

b) removal of small amounts of asbestos containing insulation on beams or above ceilings

c) replacement of an asbestos containing gasket on a valve

d) installation or removal of a small section of drywall

e) installation of electrical conduit through or close to ACM

f) removal of small quantities of ACM only if required in the performance of anther maintenance activity not intended as asbestos abatement

g) removal of asbestos containing insulation not to exceed amounts greater than can be contained in a single glove bag

h) minor repairs to to damaged thermal system insulation which do not require removal

i) repairs to a piece of asbestos containing wallboard

j) repairs involving encapsulation, enclosure or removal to small amounts of friable ACM only if in the performance of emergency or routine maintenance activity

Others?

k)

l)

m)

n)

REGULATORY REVIEW

INTRODUCTION

To date, two federal agencies have been principally responsible for generating regulations for asbestos control. These two agencies are the U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA).

Other federal agencies promulgating regulations regarding asbestos include the Department of Transportation (DOT) regulations regarding the transport of asbestos, the National Bureau of Standards - establishing standards and protocols for laboratory accreditation, and the Consumer Product Safety Commission-banning asbestos in some products. Exhibit L-1 presents a chronology of major federal initiatives regarding asbestos. These initiatives span the period of the early 1970's through the present.

EPA WORKER PROTECTION RULE

This regulation extends the OSHA standards to state and local employees who perform asbestos work, and who are not covered by the OSHA Asbestos Standards, or by a state OSHA plan. The Rule parallels OSHA requirements and covers medical examinations, air monitoring and reporting, protective equipment, work practices, and recordkeeping.

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP) [40 CFR 61 Part M]

EPA's rules concerning the application, removal and disposal of asbestos-containing materials were issued under NESHAP. Also included in NESHAP are rules concerning manufacturing, spraying and fabricating of asbestos-containing material.

What notification requirements are specified under NESHAP?

- At least 10 days' advance notice must be filed when a building is to be demolished or "as early as possible before renovation begins," if more than 260 linear feet of asbestos pipe covering or 160 square feet of asbestos surfacing material are removed during building renovation.

- At least 20 days' advance notice must be filed before demolition if the amount of friable asbestos materials in the facility being demolished is less than 260 linear feet or 160 square feet.

- If less than 260 linear feet or 160 square feet of friable ACM is being removed at a facility being renovated, no notice is required.
- The following information is required on the notice:
  - Name and address of the building owner or manager;
  - Description and location of the building;
  - Estimate of the approximate amount of friable ACM present in the facility;
  - Scheduled starting and completion dates of ACM removal;
  - Description of planned removal methods;
  - Procedures to be used to comply with the requirements of this regulation; and
  - Name, address, and location of the disposal site.

What does NESHAPS require regarding the removal of ACM, if more than 160 linear feet or 260 square feet are present?

- Removal is required prior to demolition and prior to renovation if the renovation would "break up" or make the ACM "unaccessible."
- Friable asbestos must be removed using wet removal techniques.
- With special approval from EPA, dry removal is allowed under certain circumstances.
- No visible emissions of dust to the outside air are permitted during removal or renovation.

What disposal requirements are specified under NESHAPS?

- No visible emissions to the outside air are allowed during collection, packaging, transportation, or deposition of ACM waste.
- Wet ACM must be sealed in a leak-tight container.
- Containers must be labeled with OSHA labels.

Since NESHAP mandates the removal of friable ACM before a building is demolished, the plan for managing ACM should take into account the costs of eventual removal. The same is true for future renovation work covered by NESHAP. The Management Planner should also keep in mind that certain abatement methods such as encapsulation and enclosure may make eventual removal more difficult.

FRIABLE ACM IN SCHOOLS: IDENTIFICATION AND NOTIFICATION RULE [40 CFR Part 763]

According to the 1982 "Schools Rule," all public and private primary and secondary schools were to be inspected for friable ACM by June 28, 1983.

What materials were schools to inspect?

- All friable materials were to be inspected and sampled or assumed to be ACM.
- This includes primarily surfacing materials and thermal system insulation.

What were local education agencies to report if they found or assumed ACM was present?

- School employees and parent-teacher organizations (or parents in the absence of an organized group) were to be informed of the location of friable ACM.
- Custodial workers were to be provided a copy of a one-page EPA publication: "A Guide for Reducing Asbestos Exposure."

What records need to be maintained?

- LEA's must maintain records of all investigations and results of bulk sampling.
- Evidence must also be retained of employee and parent notification.

Investigations of ACM in schools conducted under the "Schools Rule" should provide the starting point for Building Inspector's investigations under AHERA. However, the scope and thoroughness of the previous inspections and analyses, including the methods used, may not be sufficient to satisfy AHERA requirements.

ASBESTOS HAZARD EMERGENCY RESPONSE ACT

In October 1986 the Asbestos Hazard Emergency Response Act (AHERA) was signed into law. Included in this Act are provisions directing the EPA to establish rules and regulations addressing asbestos-containing materials in schools. Specifically, EPA was directed to address the issues of: (1) identifying, (2) evaluating, and (3) controlling ACM in schools.

Under a six-month deadline set by Congress, EPA convened a panel of representatives from various associations and interest groups which would be affected by the regulation. The panel members negotiated on many issues, and the results were published during April of 1987 in the form of a proposed rule. The final AHERA regulations (rules) became effective October 17, 1987. They are found in 40 CFR 763 Subpart E §763.80 - §763.99 under the Toxic Substances Control Act (TSCA).

To whom do the AHERA regulations apply?

- All public and private elementary and secondary schools, in the U.S. and its territories; and
- American schools on military bases in foreign countries.

What are the schools' responsibilities under the rule? [§763.82]

- To designate a person to ensure that AHERA requirements are properly implemented;
- To inspect and identify friable and non-friable ACM;
- To monitor and periodically reinspect;
- To develop and update management plans;
- To determine and implement response actions;
- To develop and implement operations and maintenance programs;
- To notify parents, building occupants and outside contractors of ACM's identified in the building; and
- To ensure that accredited persons perform these required activities under AHERA.

What is the timeframe for conducting building inspections under AHERA?

- Schools must be inspected prior to October 12, 1988. [§763.85]
- Reinspections must be conducted by accredited inspectors at least every 3 years, and by anyone every 6 months. [§763.85]

What requirements regarding bulk sampling are specified in AHERA? [§763.86]

- Schools can elect to assume that any or all materials contain asbestos. If they choose to make this assumption, no sampling is necessary.
- To determine whether suspect material contains asbestos, bulk sampling must be conducted in the manner specified.

Where and how are bulk samples to be analyzed?

- Bulk samples are to be analyzed for asbestos by laboratories accredited by the National Bureau of Standards, or laboratories with interim accreditation from EPA. [§763.87]
- Analysis shall be by polarized light microscopy (PLM), using the prescribed method.

What assessment data must be compiled by the schools? [§763.88]

- All friable ACBM and assumed ACBM must be located and categorized as to present condition, potential for damage, and type of material.
- Non-friable ACBM and assumed ACBM must be identified and documented but not assessed.

What options does the school have to manage and control ACM?

- Consideration may be given to the following response actions:
  - encapsulation;
  - enclosure;

  - operations and maintenance;
  - repair; and
  - removal [§763.81]

- Particular conditions require specified response actions. [§763.90]

When must a school implement an operations and maintenance (O&M) program? [§763.91]

- Any building where friable ACBM is present or assumed to be present must develop and implement an O&M program.
- OSHA Construction Standards [29 CFR 1926.58] and/or EPA's Worker Protection Rule [40 CFR 763.121] cover workers performing O&M and repair activities.
- The O&M program must provide for surveillance of ACM at least every 6 months.
- Additional requirements and directions for responding to fiber release episodes are specified in the regulations.

What does AHERA require of schools to substantiate that they are taking responsible action to manage and control asbestos in school buildings? [§763.93]

- On or before October 12, 1988, schools must prepare and submit, to an Agency designated by the Governor, an asbestos management plan for each building. The plan must be kept up-to-date.
- The plan is required to contain information specified in AHERA.
- Schools must begin implementation of the management plan by July 9, 1989.
- A management plan must be prepared and submitted for any building to come into service after October 12, 1988 prior to its use as a school.

What recordkeeping responsibilities does the LEA have? [§763.94]

- A detailed written description of any preventative or response action taken for ACBM must be appended tot he management plan.

- Records of air monitoring, training, surveillance, cleaning, O&M, fiber release episodes,and reinspections must be maintained and added to the management plan.

Does the school have to warn persons of the presence of ACBMs? [§763.95]

- Warnings must be posted adjacent to any ACBM located in maintenance areas of a building.

- Warning labels must read:

CAUTION: ASBESTOS. HAZARDOUS.
DO NOT DISTURB WITHOUT
PROPER TRAINING AND EQUIPMENT.

Are there penalties for not complying with AHERA? [§763.97]

- Failure to comply can result in fines ranging from $5,000 to $25,000 per day in violation.

- Criminal penalties can be invoked.

Can a LEA be excluded from any part of this rule? [§763.99]

- An inspection is not necessary if an accredited inspector determines:

    - that a previous inspection identified friable ACBM (however, while sampling is not necessary in this case, the friable ACBM must be assessed as under §763.88);

    - that a previous inspection identified non-friable ACBM (however, non-friable ACBM must be assessed to determine whether it has become friable);

    - that prior sampling showing no ACBM present was conducted in substantial compliance with AHERA;

    - that all ACM was removed; or

- that the school was built after October 12, 1988, and a registered architect verifies .that it contain no ACBM.

Who needs training under AHERA?

- o Building Inspectors -- persons who survey buildings for the presence of ACM.
- o Management Planners -- persons who conduct hazard assessments and who advise school administrators on management options.
- o Design Professionals -- persons who design abatement projects and write contract specifications for abatement work.
- o Abatement Supervisors -- persons who supervise abatement projects.
- o Abatement Workers -- persons who conduct abatement projects.

How much training is needed and how often?

- o Building Inspector -- 3 day course with field work and exam, half-day annual refresher training.
- o Management Planner -- 3 day building inspectors course plus 2 additional days and exam, 1 day annual refresher training.
- o Project Designer -- 3 day course with field work and exam, or abatement supervisor course, 1 day annual refresher training.
- o Abatement Supervisor -- 4 day course with hands-on training and exam, 1 day annual refresher training.
- o Abatement Worker -- 3 day course with hands-on training and exam, 1 day annual refresher training.

What responsibifities does a state have under AHERA?

- o Each state is to adopt an accreditation plan at least as stringent as the EPA model.

- An agency of the state is to be named to receive and review LEA's Management Plan.

STATE AND LOCAL REGULATIONS

Several provisions in AHERA encourage states to develop their own regulatory programs. For example, states are encouraged to establish and operate training and certification programs for the various categories of asbestos professionals, as long as the programs are at least as stringent as AHERA's Model Plan. In addition, some states have established requirements that exceed EPA's in the area of notification of abatement actions, abatement work practices, and transportation and disposal of asbestos-contaminated waste. Building Inspectors and Management Planners should consult state and local regulatory agencies in their areas.

Summary Outline for State Guidelines Covering Asbestos Work

Finding your way around the Oregon Administrative Rules (OAR)

Oregon Administrative Rules are arranged based on a standard code that is described in the following example based on OAR 340-25: Emission Standards and Procedural Requirements for Hazardous Air Contaminants.

Example: 340-25-465(4)(b)(A)(ii)

Chapter	Division	Rule	Section	Subsection	Paragraphs
340	25	465	(4)	(b)	(A)(ii)

This location describes the notification fees required for small-scale abatement projects.

State Rules and Regulations

What follows in this section is a summary of relevant Oregon laws that cover asbestos abatement work. For each section, the important points that concern small-scale asbestos abatement workers and abatement projects are outlined and indexed.

OAR 340-25: Asbestos Abatement Requirements

- this is the rule that gives authority to the Department of Environmental Quality to control emissions of air contaminants. (known as the Oregon NESHAPS law)

1. General rules concerning asbestos abatement projects, page 8:

   340-25-465(4): Asbestos abatement projects.

2. Notification of DEQ, page 8:

   340-25-465(4)(a)(B): notification requirements of small-scale projects.

   340-25-465(4)(a)(D): information required on notification form, page 9..

   340-25-465(4)(b)(A)(i): notification fees, page 10.

3. Procedures required to prevent emissions of particulate asbestos material into the air, page 11:

   340-25-465(4)(c): related work practices and controls.

4. Recommended work practices for small-scale workers, page 13.

   340-25-465(4)(d)(G): small-scale work practices referenced under OAR 427-83 Appendix G. This is a reference to the Oregon Occupational Safety and Health Code for construction activities affecting asbestos.

5. Disposal of asbestos-containing materials, page 15.

   340-25-465(10): waste disposal guidelines for the control of emissions of asbestos.

   340-25-465(10)(d)(A): warning labels for containers of asbestos-containing waste materials, page 16 & 17.

OAR 340-33: Licensing and Certification Requirements

1. Definition of small-scale asbestos abatement projects, page 3.

   340-33-020(17): small-scale projects.

   340-33-020(18): small-scale, short-duration renovating and maintenance activity, page 4.

2. General provisions concerning worker certification, page 4.

   340-33-030(9): after Jan 1, 1989 all workers must be certified, page 5.

3. Application for worker certification, page 7.

   340-33-050(4): application to be a certified worker must include.....

4. Exemptions for specific materials, page 11.

   340-33-100: removal of specific asbestos-containing materials that have not become friable.

5. Certification fees, page 12.

   340-33-110(3)(c): a two-year certification for a small-scale worker is $50.

Oregon Occupational Safety and Health Code
OAR 437

- it is this rule that gives the Accident Prevention Division authority to control the safety of the workplace.

OAR 437, Division 83: asbestos rules for construction

1. Permissible Exposure Limit (PEL), page 3:

   437-83-7010: PEL for asbestos = 0.2 f/cc on 8 hr TWA.

2. Regulated areas, page 4:

   437-83-7020: establish regulated areas where the PEL is exceeded.

3. Exposure monitoring, page 5:

   437-83-7025(1) - (7): guidelines for air monitoring in the workplace.

4. Respiratory protection, page 8:

   437-83-7035(1): employer shall provide respirators where required.

   (2): Respirator selection.
   (3): Respirator program.
   (4): Respirator fit testing.

5. Protective clothing, page 11:

   437-83-7040(1): employer shall provide protective clothing, page 11.

6. Warning signs to communicate hazards to employes, page 13:

   437-83-7050: warning signs and labels.

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PROPOSED

OREGON ADMINISTRATIVE RULES
CHAPTER 340, DIVISION 25 - DEPARTMENT OF ENVIRONMENTAL QUALITY

Emission Standards and Procedural Requirements for Hazardous Air Contaminants

Policy

340-25-450 The Commission finds and declares that certain air contaminants for which there is no ambient air standard may cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness, and are therefore considered to be hazardous air contaminants. Air contaminants currently considered to be in this category are asbestos, beryllium, and mercury. Additional air contaminants may be added to this category provided that no ambient air standard exists for the contaminant, and evidence is presented which demonstrates that the particular contaminant may be considered as hazardous. It is hereby declared the policy of the Department that the standards contained herein and applicable to operators are to be minimum standards, and as technology advances, conditions warrant, and Department or regional authority rules require or permit, more stringent standards shall be applied.

Stat. Auth.: ORS CH.
Hist: DEQ 96.f.9-2-75,ef.9-25-75

Definitions

340-25-455 As used in this rules, and unless otherwise required by context:

(1) "Asbestos" means [actinolite, amosite, anthophyllite, crysotile, crocidolite, or tremolite.] "the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite."

(2) "Asbestos-containing waste material" means any waste which contains friable asbestos material [commercial asbestos and is generated by a source subject to the provisions of this subpart,] including, but not limited to, asbestos mill tailings, control device asbestos waste, friable asbestos waste material, asbestos abatement project waste, and bags or containers that previously contained commercial asbestos.

(3) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or disposal of any material with the potential of releasing asbestos fibers into the air."

[3](4) "Asbestos manufacturing operation" means the combining of commercial asbestos, or in the case of woven friction products, the combining of textiles containing commercial asbestos with any other material(s) including

commercial asbestos, and the processing of this combination into a product as specified in rule 340-25-465.

[4](5) "Asbestos-containing material" means asbestos or any material containing at least 1% asbestos by weight, including particulate asbestos material.

[5[(6) "Asbestos mill" means any facility engaged in the conversion or any intermediate step in the conversion of asbestos ore into commercial asbestos.

[6](7) "Asbestos tailings" means any solid waste product of asbestos mining or milling operations which contains asbestos.

[7](8) "Beryllium" means the element beryllium. Where weight or concentrations are specified in these rules, such weights or concentrations apply to beryllium only, excluding any associated elements.

[8](9) "Beryllium alloy" means any metal to which beryllium has been added in order to increase its beryllium content, and which contains more than 0.1 percent beryllium by weight.

[9](10) "Beryllium containing waste" means any material contaminated with beryllium and/or beryllium compounds used or generated during any process or operation performed by a source subject to these rules.

[10](11) "Beryllium ore" means any naturally occurring material mined or gathered for its beryllium content.

[11](12) "Commercial asbestos" means any variety of asbestos which is produced by extracting asbestos from asbestos ore.

[12](13) "Commission" means the Environmental Quality Commission.

[13](14) "Demolition" means the wrecking or removal of any [boiler, duct, pipe, or structural member insulated or fireproofed with asbestos material or of any other thing made of friable asbestos such as decorative panels.] structural member of a facility together with related handling operations.

[14](15) "Department" means the Department of Environmental Quality.

[15](16) "Director" means the Director of the Department or regional authority and authorized deputies or officers.

(17) "Facility" means all or part of any public or private building, structure, installation, equipment, vehicle or vessel, including but not limited to ships.

[16](18) "Friable asbestos material" means any [asbestos material easily crumbled or pulverized by hand, resulting in the release of particulate asbestos material. This definition shall include any friable asbestos debris.] asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry."

[17](19) "Hazardous air contaminant" means any air contaminant considered by the Department or Commission to cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness and for which no ambient air standard exists.

[18](20) "Mercury" means the element mercury, excluding any associated elements and includes mercury in particulates, vapors, aerosols, and compounds.

[19](21) "Mercury ore" means any mineral mined specifically for its mercury content.

[20](22) "Mercury ore processing facility" means a facility processing mercury ore to obtain mercury.

[21](23) "Mercury chlor-alkali cell" means a device which is basically composed of an electrolyzer section and a denuder (decomposer) section, and utilizes mercury to produce chlorine gas, hydrogen gas, and alkali metal hydroxide.

[22](24) "Particulate asbestos material" means any finely divided particles of asbestos material.

[23](25) "Person" means any individual, corporation, association, firm, partnership, joint stock company, public and municipal corporation, political sub-division, the state and agency thereof, and the federal government and any agency thereof.

[24](26) "Propellant" means a fuel and oxidizer physically or chemically combined, containing beryllium or beryllium compounds, which undergoes combustion to provide rocket propulsion.

[25](27) "Propellant plant" means any facility engaged in the mixing, casting, or machining of propellant.

[26](28) "Regional authority" means any regional air quality control authority established under the provisions of ORS 468.505.

[27](29) "Renovation" means [the removing or stripping of friable asbestos material used to insulate or fireproof any pipe, duct, boiler, tank, reactor, turbine, furnace, decorative panel, surface or structural member.] altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or removed are excluded.

(30) "Small-scale asbestos abatement project" means any asbestos abatement project which meets the definition given in OAR 340-33-020(17).

[28](31) "Startup" means commencement of operation of a new or modified source resulting in release of contaminants to the ambient air.

[29](32) "Structural member" means any load-supporting member of a facility, such as beams and load-supporting walls; or any non-supporting member, such as ceilings and non-load-supporting walls.

Stat. Auth.: ORS Ch. 468
Hist: DEQ 96, f.9-2-75, ef. 9-25-75; DEQ 22-1982, f. & ef. 10-21-82

General Provisions

340-25-460(1) Applicability. The provisions of these rules shall apply to any source which emits air contaminants for which a hazardous air contaminant standard is prescribed. Compliance with the provisions of these rules shall not relieve the source from compliance with other applicable rules of the Oregon Administrative Rules, Chapter 340, or with applicable provisions of the Oregon Clean Air Implementation Plan.

(2) Prohibited activities:

(a) No person shall operate any source of emissions subject to these rules without first registering such source with the Department following procedures established by ORS 468.320 and OAR 340-20-005 through 340-20-015. Such registration shall be accomplished within ninety (90) days following the effective date of these rules.

(b) After the effective date of these rules, no person shall construct a new source or modify any existing source so as to cause or increase emissions of contaminants subject to these rules without first obtaining written approval from the Department.

(c) No person subject to the provisions of these emission standards shall fail to provide reports or report revisions as required in these rules.

(3) Application for approval of construction or modification. All applications for construction or modification shall comply with the requirements of rules 340-20-020 through 340-20-030 and the requirements of the standards set forth in these rules.

(4) Notification of startup. Notwithstanding the requirements of rules 340-20-020 through 340-20-030, any person owning or operating a new source of emissions subject to these emission standards shall furnish the Department written notification as follows:

(a) Notification of the anticipated date of startup of the source not more than sixty (60) days nor less than thirty (30) days prior to the anticipated date.

(b) Notification of the actual startup date of the source within fifteen (15) days after the actual date.

(5) Source reporting and approval request. Any person operating any existing source, or any new source for which a standard is prescribed in these rules which had an initial startup which preceded the effective date of these rules shall provide the following information to the Department within ninety (90) days of the effective date of these rules:

(a) Name and address of the owner or operator.

(b) Location of the source.

(c) A brief description of the source, including nature, size, design, method of operations, design capacity, and identification of emission points of hazardous contaminants.

(d) The average weight per month of materials being processed by the source and percentage by weight of hazardous contaminants contained in the processed materials, including yearly information as available.

(e) A description of existing control equipment for each emission point, including primary and secondary control devices and estimated control efficiency of each control device.

(6) Source emission tests and ambient air monitoring:

(a) Emission tests and monitoring shall be conducted using methods set forth in 40 CFR, Part 61, Appendix B, as published in the Code of Federal Regulations last amended by the Federal Register, [June 8, 1982, pages 24703 to 24716.] June 1, 1987, at 52 FR 20398. The methods described in 40 CFR, Part 61, Appendix B, are adopted by reference and made a part of these rules. Copies of these methods are on file at the Department of Environmental Quality.

(b) At the request of the Department, any source subject to standards set forth in these rules may be required to provide emission testing facilities as follows:

(A) Sampling ports, safe sampling platforms, and access to sampling platforms adequate for test methods applicable to such source.

(B) Utilities for sampling and testing equipment.

(c) Emission tests may be deferred if the Department determines that the source is meeting the standard as proposed in these rules. If such a deferral of emission tests is requested, information supporting the request shall be submitted with the request for written approval of operation. Approval of a deferral of emission tests shall not in any way prohibit the Department from canceling the deferral if further information indicates that such testing may be necessary to insure compliance with these rules.

(7) Delegation of authority. The Commission may, when any regional authority requests and provides evidence demonstrating its capability to carry out the provisions of these rules relating to hazardous contaminants, authorize and confer jurisdiction within its boundary until such authority and jurisdiction shall be withdrawn for cause by the Commission. Such a regional authority may establish, collect, retain, and expend project notification fees for asbestos abatement projects within its jurisdiction for the purpose of supporting the regional authority's asbestos control program. Fee amounts established by a regional authority may differ from the fee amounts established by the Department under these rules.

[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality in Portland.]

Stat. Auth.: ORS Ch. 468
Hist: DEQ 96, f. 9-2-75, ef. 9-25-75; DEQ 22-1982, f. & ef. 10-21-82

Emission Standards and Procedural Requirements for Asbestos

340-25-465(1) Emission standard for asbestos mills. No person shall cause to be discharged into the atmosphere any visible emissions from any asbestos milling operation except as provided under section (7) of this rule. For purposes of these rules, the presence of uncombined water in the emission plume shall not be cause for failure to meet the visible emission requirement. Outside storage of asbestos materials is not considered a part of an asbestos mill.

(2) Roadways and Parking Lots. The surfacing of roadways, parking lots or any other surface covering on which vehicle traffic might reasonably be expected to occur, with asbestos tailings or asbestos material is prohibited, except for temporary roadways on an area of asbestos ore deposits. For purposes of these rules, the deposition of asbestos tailings on roadways covered by snow or ice is considered surfacing.

(3) Manufacturing. No person shall cause to be discharged into the atmosphere any visible emissions, except as provided in section (7) of this rule, from any building or structure in which manufacturing operations utilizing commercial asbestos are conducted, or directly from any such manufacturing operations if they are conducted outside buildings or structures. Visible emissions from boilers or other points not producing emissions directly from the manufacturing operation ;and having no possible asbestos material in the exhaust gases shall not be considered for purposes of this rule. The presence of uncombined water in the exhaust plume shall not be cause for failure to meet the visible emission requirements. Manufacturing operations considered for purposes of these rules are as follows:

(a) The manufacture of cloth, cord, wicks, tubing, tape, twine, rope, thread, yarn, roving, lap, or other textile materials.

(b) The manufacture of cement products.

(c) The manufacture of fireproofing and insulating materials.

(d) The manufacture of friction products.

(e) The manufacture of paper, millboard, and felt.

(f) The manufacture of floor tile.

(g) The manufacture of paints, coatings, caulks, adhesives, or sealants.

(h) The manufacture of plastics and rubber materials.

(i) The manufacture of chlorine.

(j) The manufacture of shotgun shells.

(k) The manufacture of asphalt concrete.

(l) Any other manufacturing operation which results or may result in the release of asbestos material to the ambient air.

(4) [Demolition and renovation] Asbestos abatement projects. All persons, both the contractor and the owner, intending to [demolish any institutional, commercial, or industrial building, including apartment buildings having four or more dwelling units, structure, facility, installation, or any vehicle or vessel including, but not limited to, ships; or any portion thereof which contains any boiler, pipe, duct, tank, reactor, turbine, furnace, or structural member that is insulated or fireproofed with friable asbestos material] conduct an asbestos abatement project shall comply with the requirements set forth in this rule[:]. Any asbestos abatement project in a private residence is exempt from OAR 340-25-465(4) if the residence is occupied by the owner and the owner occupant performs the asbestos abatement. Any activity which is exempted under OAR 340-33-100 is also exempt from OAR 340-25-465(4).

[(a) Notice of intention to demolish and/or renovate shall be provided to the Department prior to commencement of such demolition and/or renovation. Such notice shall include the following information:]

(a) Notification requirement. Each facility owner or operator, or contractor to which this section applies shall:

Notification

(A) Provide the Department with written notice on a Department form of intent to conduct any asbestos abatement project. Submit the written notice and project notification fee at least 10 days before beginning any asbestos abatement project; or

(B) Facility owners or operators employing workers certified as required by OAR 340-33-060 to conduct small-scale asbestos abatement projects at the facility may notify the Department as follows:

(i) Establish eligibility for use of this procedure with the Department prior to use.

(ii) Maintain on file with the Department a general asbestos abatement plan containing the information specified in subsection (D) below, to the extent possible, and

(iii) Provide to the Department a summary report of all small-scale asbestos abatement projects conducted at the facility in the previous three months by the 15th day of the month following the end of the calendar quarter.

PROPOSED

OREGON ADMINISTRATIVE RULES
LICENSING AND CERTIFICATION REQUIREMENTS
Chapter 340 Division 33

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ASBESTOS REQUIREMENTS

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OREGON ADMINISTRATIVE RULES

LICENSING AND CERTIFICATION REQUIREMENTS

ASBESTOS REQUIREMENTS

AUTHORITY, PURPOSE, & SCOPE

340-33-010 (1) Authority. These rules are promulgated in accordance with and under the authority of ORS 468.893.

(2) Purpose. The purpose of these rules is to provide reasonable standards for:

(a) training and licensing of asbestos abatement project contractors,

(b) training and certification of asbestos abatement project supervisors and workers,

(c) accreditation of providers of training of asbestos contractors, supervisors, and workers,

(d) administration and enforcement of these rules by the Department.

(3) Scope

(a) OAR 340-33-000 through -110 is applicable to all work, including demolition, renovation, repair, construction, or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling, or disposal of any material which could potentially release asbestos fibers into the air; except as provided in (b) and (c) below.

(b) OAR 340-33-000 through -110 do not apply to an asbestos abatement project performed in a private residence if the residence is occupied by the owner, and the owner occupant is performing the asbestos abatement work.

(c) OAR 340-33-010 through -110 do not apply to persons performing vehicle brake and clutch maintenance or repair.

(d) Full scale asbestos abatement projects are differentiated from smaller projects. Small-scale asbestos abatement projects as defined by OAR 340-33-020(18) are limited by job size and include projects,

(A) where the primary intent is to disturb the asbestos-containing material and prescribed work practices are used, and

(B) where the primary intent is not to disturb the asbestos-containing material.

(e) The Department has determined that asbestos-abatement projects involving some materials do not cause a worker or public health hazard if reasonable safety precautions are used. Provisional exemptions for these materials are listed in OAR 340-33-100.

(f) OAR 340-33-000 through -110 provide training, licensing, and certification standards for implementation of OAR 340-25-465, Emission Standards and Procedural Requirements for Asbestos.

DEFINITIONS

340-33-020 As used in these rules,

(1) "Accredited" means a provider of asbestos abatement training courses is authorized by the Department to offer training courses that satisfy requirements for contractor licensing and worker training.

(2) "Agent" means an individual who works on an asbestos abatement project for a contractor but is not an employe of the contractor.

(3) "Asbestos" means the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

(4) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or disposal of any asbestos-containing material which could potentially release asbestos fibers into the air.

(5) "Asbestos-containing material" means any material containing more than one percent asbestos by weight.

(6) "Certified" means a worker has met the Department's training, experience, and/or quality control requirements and has a current certification card.

(7) "Contractor" means a person that undertakes for compensation an asbestos abatement project for another person. As used in this subsection, "compensation" means wages, salaries, commissions and any other form of remuneration paid to a person for personal services.

(8) "Commission" means the Environmental Quality Commission.

(9) "Department" means the Department of Environmental Quality.

(10) "Director" means the Director of the Department of Environmental Quality.

(11) "EPA" means the United States Environmental Protection Agency.

(12) "Facility" means all or part of any public or private building, structure, installation, equipment, vehicle or vessel, including but not limited to ships.

(13) "Friable asbestos material" means any asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry.

(14) "Full-scale asbestos abatement project" means any removal, renovation, encapsulation, repair or maintenance of any asbestos-containing material which could potentially release asbestos fibers into the air, and which is not classified as a small-scale project as defined by (17) below.

(15) "Licensed" means a contracting entity has met the Department's training, experience, and/or quality control requirements to offer and perform asbestos abatement projects and has a current asbestos abatement contractor license.

(16) "Persons" means an individual, public or private corporation, nonprofit corporation, association, firm, partnership, joint venture, business trust, joint stock company, municipal corporation, political subdivision, the state and any agency of the state or any other entity, public or private, however organized.

(17) "Small-scale asbestos abatement project" means small-scale, short-duration projects as defined by (18) below, and/or removal, renovation, encapsulation, repair, or maintenance procedures intended to prevent asbestos containing material from releasing fibers into the air and which:

(a) Remove, encapsulate, repair or maintain less than 40 linear feet or 80 square feet of asbestos-containing material;

(b) Do not subdivide an otherwise full-scale asbestos abatement project into smaller sized units in order to avoid the requirements of these rules;

(c) Utilize all practical worker isolation techniques and other control measures; and

(d) Do not result in worker exposure to an airborne concentration of asbestos in excess of 0.1 fibers per cubic centimeter of air calculated as an eight (8) hour time weighted average.

(18) "Small-scale, short-duration renovating and maintenance activity" means a task for which the removal of asbestos is not the primary objective of the job, including, but not limited to:

(a) Removal of quantities of asbestos-containing insulation on pipes;

(b) Removal of small quantities of asbestos-containing insulation on beams or above ceilings;

(c) Replacement of an asbestos-containing gasket on a valve;

(d) Installation or removal of a small section of drywall; or

(e) Installation of electrical conduits through or proximate to asbestos -containing materials.

Small-scale, short duration activities shall be limited to no more than 40 linear feet or 80 square feet of asbestos containing material. An asbestos abatement activity that would otherwise qualify as a full-scale abatement project shall not be subdivided into smaller units in order to avoid the requirements of these rules.

(19) "Trained worker" means a person who has successfully completed specified training and can demonstrate knowledge of the health and safety aspects of working with asbestos.

(20) "Worker" means an employe or agent of a contractor or facility owner or operator.

GENERAL PROVISIONS

340-33-030 (1) Persons engaged in the removal, encapsulation, repair, or enclosure of any asbestos-containing material which has the potential of releasing asbestos fibers into the air must be licensed or certified, unless exempted by OAR 340-33-010(3).

(2) An owner or operator of a facility shall not allow any persons other than those employees of the facility owner or operator who are appropriately certified or a licensed asbestos abatement contractor to perform an asbestos abatement project in or on that facility. Facility owners and operators are not required to be licensed to perform asbestos abatement projects in or on their own facilities.

(3) Any contractor engaged in a full-scale asbestos abatement project must be licensed by the Department under the provisions of OAR 340-33-040.

(4) Any person acting as the supervisor of any full-scale asbestos abatement project must be certified by the Department as a Supervisor for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050.

(5) Any worker engaged in or working on any full-scale asbestos abatement project must be certified by the Department as a Worker for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050.

(6) Any contractor or worker engaged in any small-scale asbestos abatement project as defined by OAR 340-33-020(17)(a) through (d) or 340-33-020(18), but not licensed or certified to perform full-scale asbestos abatement projects, must be licensed or certified by the Department as a Small-Scale Asbestos Abatement Contractor or a Worker for Small-Scale Asbestos Abatement, respectively under the provisions of OAR 340-33-040 and -050.

(7) Any provider of training which is intended to satisfy the licensing and certification training requirements of these rules must be accredited by the Department under the provisions of OAR 340-33-060.

(8) Any person licensed, certified, or accredited by the Department under the provisions of these rules shall comply with the appropriate provisions of OAR 340-25-465 and OAR 340-33-000 through -110, or be subject to suspension or revocation of license, or certification, or accreditation.

(9) Asbestos abatement contractors and workers may perform asbestos abatement projects without a license or certificate until January 1, 1989. Thereafter, any contractor or worker engaged in an asbestos abatement project must be licensed or certified by the Department.

(10) The Department may accept evidence of violations of these rules from representatives of other federal, state, or local agencies.

(11) A regional air pollution authority may inspect for and enforce against violations of licensing and certification regulations. A regional air pollution authority may not approve, deny, suspend or revoke a training provider accreditation, contractor license, or worker certification, but may refer violations to the Department and recommend denials, suspensions, or revocations.

(12) An extension of time beyond January 1, 1989, for mandatory contractor licensing, supervisor certification or worker certification may be approved by the Commission if:

(a) Adequate accredited training as required for any of the categories of licensing or certification is not available in the State, and

(b) There is a public health or worker danger created due to inadequate numbers of appropriately licensed or certified persons to properly perform asbestos abatement activities.

(13) Variances from these rules may be granted by the Commission under ORS 468.345.

CONTRACTOR LICENSING

340-33-040 (1) Contractors may be licensed to perform either of the following categories of asbestos abatement projects:

(a) Full-Scale Asbestos Abatement Contractors: All asbestos abatement projects, regardless of project size or duration, or

(b) Small-Scale Asbestos Abatement Contractor: Small-scale asbestos abatement projects.

(2) Application for licenses shall be submitted on forms prescribed by the Department and shall be accompanied by:

(a) Documentation that the contractor, or contractor's employee representative, is certified at the appropriate level by the Department:

(A) Full-scale Asbestos Abatement Contractor license: Certified Supervisor for Full-Scale Asbestos Abatement.

(B) Small-Scale Asbestos Abatement Contractor: Certified Worker for Small-Scale Asbestos Abatement.

(b) Certification that the contractor has read and understands the applicable Oregon and federal rules and regulations on asbestos abatement and agrees to comply with the rules and regulations.

(c) A list of all certificates or licenses, issued to the contractor by any other jurisdiction, that have been suspended or revoked during the past one (1) year, and a list of any asbestos-related enforcement actions taken against the contractor during the past one (1) year.

(d) List any additional project supervisors for full-scale projects and their certification numbers Supervisors for Full-Scale Asbestos Abatement at the Certified Supervisor level.

(e) Summary of asbestos abatement projects conducted by the contractor during the past 12 months.

(f) A license application fee.

(3) The Department will review the application for completeness. If the application is incomplete, the Department shall notify the applicant in writing of the deficiencies.

(4) The Department shall deny, in writing, a license to a contractor who has not satisfied the license application requirements.

(5) The Department shall issue a license to the applicant after the license is approved.

(6) The Department shall grant a license for a period of 12 months. Licenses may be extended during Department review of a renewal application.

(7) Renewals:

(a) License renewals must be applied for in the same manner as is required for an initial license.

(b) For renewal, the contractor or employee representative must have completed at least the appropriate annual refresher course.

(c) The complete renewal application shall be submitted no later than 60 days prior to the expiration date.

(8) The Department may suspend or revoke a license if the licensee:

(a) Fraudulently obtains or attempts to obtain a license.

(b) Fails at any time to satisfy the qualifications for a license or comply with the rules adopted by the Commission.

(c) Fails to meet any applicable state or federal standard relating to asbestos abatement.

(d) Permits an untrained or uncertified worker to work on an asbestos abatement project.

(e) Employs a worker who fails to comply with applicable state or federal rules or regulations relating to asbestos abatement.

(9) A contractor who has a license revoked may reapply for a license after demonstrating to the Department that the cause of the revocation has been resolved.

WORKER CERTIFICATION

340-33-050 (1) Workers on asbestos abatement projects shall be certified at one or more of the following levels:

(a) Certified Supervisor for Full-Scale Asbestos Abatement.

(b) Certified Worker for Full-Scale Asbestos Abatement.

(c) Certified Worker for Small-Scale Asbestos Abatement.

(2) Application for Certification-General Requirements

(a) Applications shall be submitted to the provider of the accredited training course within thirty (30) days of completion of the course.

(b) Applications shall be submitted on forms prescribed by the Department and shall be accompanied by:

(A) Proof that the applicant is at least 18 years of age.

(B) A certification fee

(3) Application to be a Certified Supervisor for Full-Scale Asbestos Abatement shall include:

(a) Documentation that the applicant has successfully completed the Supervisor for Full-Scale Asbestos Abatement level training and examination as specified in the Department guidance document, and

(b) Documentation that the applicant has been certified as a Worker for Full-Scale Asbestos Abatement and has at least 3 months of full-scale asbestos abatement experience, including time on powered air purifying respirators and experience on at least five separate asbestos abatement projects.

(4) Application to be a Certified Worker for Asbestos Abatement shall include:

(a) Documentation that the applicant to be a Certified Worker for Full-Scale Asbestos Abatement has successfully completed the Worker for Full-Scale Asbestos Abatement level training and examination as specified in the Department guidance document.

(b) Documentation that the applicant to be a Certified Worker for Small-Scale Asbestos Abatement has successfully completed the Worker for Small-Scale Asbestos Abatement level training and examination as specified in the Department guidance document.

(5) Training course providers shall issue certification to an applicant who has fulfilled the requirements of certification.

(6) Certification at all levels is valid for a period of twenty-four (24) months after the date of issue.

(7) Renewals

(a) Certification renewals must be applied for in the same manner as application for original certification.

(b) To gain renewal of certification, the worker must complete the appropriate annual refresher course no sooner than nine (9) months and no later than twelve (12) months after the issuance date of the certificate, and again no sooner than three (3) months prior to the expiration date of the certificate.

(8) The Department may suspend or revoke a worker's certificate for failure to comply with any state or federal asbestos abatement rule or regulations.

(9) If a certification is revoked, the worker may reapply for another initial certification only after twelve (12) months from the revocation date.

(10) A current worker certification photo identification card shall be available for inspection at each asbestos abatement project site for each worker conducting asbestos abatement activities on the site.

TRAINING PROVIDER ACCREDITATION

340-33-060 (1) General

(a) Asbestos training courses required for licensing or certification under these rules may be provided by any person, environmental or health consulting firm, union or trade association, educational institution, public health organization, or other entity.

The summary report shall include the starting and completion dates; location at the facility; amount of asbestos abated by removal; linear feet, square feet, thickness; and a description of any significant variations from the general asbestos abatement plan, for each project.

(iv) Submit the project notification fee prior to use of this notification procedure and annually thereafter; or

(C) Contractors performing small-scale asbestos abatement projects may notify the Department as follows:

(i) Establish eligibility for use of this procedure with the Department prior to use;

(ii) Maintain on file with the Department a general asbestos abatement plan containing the information specified in subsection (D) below, to the extent possible;

(iii) Provide to the Department a monthly summary of all small-scale projects performed by the 15th day of the following month including the starting and completion dates; project location; amount of asbestos abated by removal; linear feet, square feet, thickness; and a description of any significant variations from the general asbestos abatement plan for each project.

(iv) Provide to the Department, upon request, a list of asbestos abatement projects which are scheduled or are being conducted at the time of the request.

(v) Submit the project notification fee in advance.

(D) Provide the following information on the notification form:

[(A)](i) Name and address of person intending to engage in [demolition.] asbestos abatement.

[(B)](ii) Description of building, structure, facility, installation, vehicle, or vessel to be demolished or renovated, including address or location where the [demolition] asbestos abatement project is to be accomplished.

(iii) Contractor's Oregon asbestos abatement license number and certificate number of the supervisor, when applicable, or certification number of the facility owner or operator's trained worker.

(iv) Facility owner's or operator's name, address and phone number.

[(C)](v) Scheduled starting and completion dates of [demolition.] asbestos abatement work.

[(D)](vi) Method of [demolition and/or of renovation] asbestos abatement to be employed.

[(E)](vii) Procedures to be employed to insure compliance with provisions of this section.

(viii) Description of the asbestos type, approximate asbestos content (percent), and location of the asbestos-containing material.

(ix) Amount of asbestos to be abated: linear feet, square feet, thickness.

(x) Names, addresses, and phone numbers of waste transporters, if different than abatement contractor.

[(F)](xi) Name and address or location of the waste disposal site where the friable asbestos waste will be deposited.

[(G) Name and address of owner of facility to be demolished or renovated.]

(xii) Description of asbestos disposal procedure.

(E) Notification by phone is permitted in case of an emergency involving protection of life, health or property. Notification shall include the information contained in (5) above, and the date of the contract if applicable. Written notification shall be submitted within three (3) days after the start of the emergency abatement.

(F) Notify the Department prior to any changes in scheduled dates.

(b) Notification fees

(A) Facility owners or operators, or contractors, shall pay to the Department a project notification fee of:

(i) Twenty-five dollars ($25) for each small-scale asbestos abatement project.

(ii) Twenty-five dollars ($25) for each monthly notification of small-scale projects under OAR 340-25-465(4)(a)(C).

(iii) Two hundred dollars per year ($200/yr) for small-scale projects conducted by certified employees of facility owners or operators, as part of an operation and maintenance program under OAR 340-25-465(4)(a)(B).

(iv) Fifty dollars ($50) for each project greater than 40 linear feet or 80 square feet, and less than 260 linear feet or 160 square feet.

(v) Two hundred dollars ($200) for each project greater than 260 linear feet or 160 square feet, and less than 2600 linear feet or 1600 square feet.

(vi) Five hundred dollars ($500) for each project greater than 2600 linear feet or 1600 square feet.

(B) No project notification fee shall be assessed for asbestos abatement projects conducted in the following residential buildings: site-built homes, modular homes constructed offsite, condominium units, mobile homes, and duplexes or other multi-unit residential buildings consisting of four units or less.

(C) For the purposes of this fee schedule, each 3-month period of an ongoing abatement project shall be assessed another project notification fee.

(D) Requests for waiver of fees shall be made in writing to the Director, on a case-by-case basis, and be based upon financial hardship. Applicants for waivers must describe the reason for the request and certify financial hardship. The Director may waive part or all of a fee.

(E) Project notification fees shall be payable with the completed project notification form. No notification will be considered to have occurred until the notification fee is submitted.

(F) Failure of provide payment for an operation and maintenance program fee shall void the operation and maintenance program and each subsequent abatement project shall be individually assessed the appropriate fee based on the size of the project.

(G) The project notification fee specified in OAR 340-465(4)(b)(A) shall be increased by 50% when an asbestos abatement project is commenced without filing of a project notification and/or submittal of a notification fee.

[(b)](c) The following procedures shall be employed to prevent emissions of particulate asbestos material into the ambient air:

[(A) Friable asbestos materials used to insulate, decorate or fireproof any boiler, pipe, duct, or structural member shall be wetted and removed from any building, structure, facility, installation, or vehicle or vessel before demolition of structural members is commenced. Boilers, pipe, duct, or structural members that contain or are insulated or fireproofed with friable asbestos materials may be removed as units or in sections without stripping or wetting, except that where the boiler, pipe, duct, or structural member is cut or disjointed the exposed friable asbestos material shall be wetted. Friable asbestos debris shall be wetted adequately to insure that such debris remains wet during all stages of demolition and related handling operations.

(B) No pipe, duct, or structural member that is covered with asbestos material shall be dropped or thrown to the ground from any building structure, facility, installation, vehicle, or vessel subject to this section, but shall be carefully lowered or taken to ground level in such a manner as to insure that no particulate asbestos material is released to the ambient air.

(C) No friable asbestos debris shall be dropped or thrown to the ground rom any building structure, facility, installation, vehicle, or vessel subject to this section, or from any floor to any floor below. Any debris generated as a result of demolition occurring fifty (50) feet (15.24 meters) or greater above ground level shall be transported to the ground via dust-tight chutes or containers.

(D) For renovation operations, local exhaust ventilation and collection systems may be used, instead of wetting; these systems shall comply with section (7) of this rule.

(c) Any person intending to demolish a building, structure, facility, or installation subject to the provisions of this section, but which has been declared by proper state or local authorities to be structurally unsound and which is in danger of imminent collapse is exempt from the requirements of this section, other than the reporting requirements specified in subsection (4)(a) of this rule, and the wetting of friable asbestos debris as specified in paragraph (4)(b) of this rule.

(d) Sources located in cities or other areas of local jurisdiction having demolition regulations or ordinances no less restrictive than those of this rule may be exempted from the provisions of this section. Such local ordinance or regulation must be filed with and approved by the Department before an exemption from these rules may be issued. Any authority having such local jurisdiction shall annually submit to the Department a list of all sources subject to this section operating within the local jurisdictional area and a list of those sources observed by the local authority during demolition operations.]

(A) Remove friable asbestos materials before any wrecking or dismantling that would break up the materials or preclude access to the materials for subsequent removal. However, friable asbestos materials need not be removed before demolition if:

(i) They are on a facility component that is encased in concrete or other similar material; and

(ii) These materials are adequately wetted whenever exposed during demolition.

(B) Adequately wet friable asbestos materials when they are being removed. In renovation, maintenance, repair, and construction operations, wetting that would unavoidably damage equipment is not required if the owner or operator:

(i) Demonstrates to the Department that wetting would unavoidably damage equipment, and

(ii) Uses a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the asbestos abatement project.

(C) When a facility component covered or coated with friable asbestos materials is being taken out of the facility as units or in sections:

(i) Adequately wet any friable asbestos materials exposed during cutting or disjointing operation; and

(ii) Carefully lower the units or sections to ground level, not dropping them or throwing them.

(D) For friable asbestos materials being removed or stripped

(i) Adequately wet the materials to ensure that they remain wet until they are disposed of in accordance with OAR 340-25-465(10); and

(ii) Carefully lower the materials to the ground or a lower floor, not dropping or throwing them; and

(iii) Transport the materials to the ground via dust-tight chutes or containers if they have been removed or stripped more than 50 feet above ground level and were not removed as units or in sections.

(E) If a facility is being demolished under an order of the State or a local governmental agency, issued because the facility is structurally unsound and in danger of imminent collapse, the requirements of subsections (b)(A) through (D) of this section shall not apply, provided that the portion of the facility that contains friable asbestos materials in adequately wetted during the wrecking operation.

(F) Work practices and engineering controls employed on-site during the performance of full-scale asbestos abatement projects and small-scale asbestos abatement projects by contractors and/or workers who are not otherwise subject to the requirements of the Oregon Department of Insurance and Finance, Accident Prevention Division, shall be in compliance with those specified in OAR Chapter 437, Division 83 (Construction) and OAR Chapter 437, Division 115 (Asbestos).

(G) Contractors licensed and workers certified to conduct only small-scale asbestos abatement projects under OAR 340-33 may use only those work practices and engineering controls specified by OAR 437-83 Appendix G (Asbestos) unless the Department authorizes other methods on a case-by-case basis.

(H) The Director or the Director's designee may approve, on a case-by-case basis, requests to use an alternative to a specific worker or public health protection requirement as provided by these rules for an asbestos abatement project. The contractor or facility owner or operator must submit in advance a written description of the alternative procedure which demonstrates to the Director's, or designee's, satisfaction that the proposed alternative procedure provides worker and public health protection equivalent to the protection that would be provided by the specific provision, or that such level of protection cannot be obtained for the asbestos abatement project.

(5) Spraying:

(a) No person shall cause to be discharged into the atmosphere any visible emissions from any spray-on application of materials containing more than one (1) percent asbestos on a dry weight basis used to insulate or fireproof equipment or machinery, except as provided in section (7) of this rule. Spray-on materials used to insulate or fireproof buildings, structures, pipes, and conduits shall contain less than one (1) percent asbestos on a dry weight basis. In the case of any city or area of local jurisdiction having ordinances or regulations for spray application materials more stringent than those in this section, the provisions of such ordinances or regulations shall apply.

(b) Any person intending to spray asbestos materials to insulate or fireproof buildings, structures, pipes, conduits, equipment, or machinery shall report such intention to the Department prior to the commencement of the spraying operation. Such report shall contain the following information:

(A) Name and address of person intending to conduct the spraying operation.

(B) Address or location of the spraying operation.

(C) The name and address of the owner of the facility being sprayed.

(c) The spray-on application of materials in which the asbestos fibers are encapsulated with a bituminous or resinous binder during spraying and which are not friable after drying is exempted from the requirements of subsections (5)(a) and (b) of this rule.

(6) Options for air cleaning. Rather than meet the no visible emissions requirements of sections (1), (3), and (4) of this rule, owners and operators may elect to use methods specified in section (7) of this rule.

(7) Air cleaning. All persons electing to use air cleaning methods rather than comply with the no visible emission requirements must meet all provisions of this section:

(a) Fabric filter collection devices must be used, except as provided in subsections (b) and (c) of this section. Such devices must be operated at a pressure drop of no more than four (4) inches (10.16 cm) water gauge as measured across the filter fabric. The air flow permeability, as determined by ASTM Method D737-69, must not exceed 30 ft.^{3}/min./ft.^{2} (9.144 m^3/min./m^2) for woven fabrics or 35 ft.^{3}/min.ft.^{2} (10.67 m^3/min./m^2) for felted fabrics with the exception that airflow permeability for 40 ft.^{3}/min./ft.^{2} (12.19 m^3/min./m^2) for woven and 45 ft.^{3}/min./ft.^{2} (13.72 m^3/min./m^2) for felted fabrics shall be allowed for filtering air emissions from asbestos ore dryers. Each square yard (square meter) of felted fabric must weigh at least 14 ounces (396.9 grams) and be at least one-sixteenth (1/16) inch (1.50 mm) thick throughout. Any synthetic fabrics used must not contain fill yarn other than that which is spun.

(b) If the use of fabric filters creates a fire or explosion hazard, the Department may authorize the use of wet collectors designed to operate with a unit contacting energy of at least forty (40) inches (101.6 cm) of water gauge pressure.

(c) The Department may authorize the use of filtering equipment other than that described in subsections (7)(a) and (b) of this rule if such filtering equipment is satisfactorily demonstrated to provide filtering of asbestos material equivalent to that of the described equipment.

(d) All air cleaning devices authorized by this section must be properly installed, operated, and maintained. Devices to bypass the air cleaning equipment may be used only during upset and emergency conditions, and then only for such time as is necessary to shut down the operation generating the particulate asbestos material.

(e) All persons operating any existing source using air cleaning devices shall, within ninety (90) days of the effective date of these rules, provide the following information to the Department:

(A) A description of the emission control equipment used for each process.

(B) If a fabric is utilized, the following information shall be reported:

(i) The pressure drop across the fabric filter in inches water gauge and the airflow permeability in $ft.^3/min./ft.^2$ ($m^3/min./m^2$).

(ii) For woven fabrics, indicate whether the fill yarn is spun or not spun.

(iii) For felted fabrics, the density in $ounces/yard^3$ (gms/m^3) and the minimum thickness in inches (centimeters).

(C) If a wet collector is used the unit contact energy shall be reported in inches of pressure, water gauge.

(D) All reported information shall accompany the information required in paragraph 340-25-460(5)(a)(E).

(8) Fabricating: No person shall cause to be discharged into the atmosphere any visible emissions except as provided in section (7) of this rule, from any fabricating operations including the following, if they use commercial asbestos or, from any building or structure in which such operations are conducted.

(a) The fabrication of cement building products.

(b) The fabrication of friction products, except those operations that primarily install asbestos friction materials on motor vehicles.

(c) The fabrication of cement or silicate board for ventilation hoods; ovens; electrical panels; laboratory furniture; bulkheads, partitions and ceilings for marine construction; and flow control devices for the molten metal industry.

(9) Insulation: Molded insulating materials which are friable and wet-applied insulating materials which are friable after drying, installed after the effective date of these regulations, shall contain no commercial asbestos. The provisions of this section do not apply to insulating materials which are spray applied: such materials are regulated under section (3) of this rule.

(10) [Waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations:] Disposal of asbestos-containing waste material: The owner or operator of any source covered under the provisions of sections (3), (4), (5), or (8) of this rule or any other source of asbestos-containing waste material shall meet the following standards:

(a) There shall be no visible emissions to the outside air, except as provided in subsection (10)(c) of this section, during the collection; processing, including incineration; packaging; transporting; or deposition of any asbestos-containing waste material which is generated by such source.

(b) All asbestos-containing waste material shall be disposed of at a disposal site authorized by the Department.

(A) Persons intending to dispose of [waste-containing] asbestos-containing waste material shall notify the landfill operator of the type and volume of the waste material and obtain the approval of the landfill operator prior to bringing the waste to the disposal site.

(B) All [waste-containing] asbestos-containing waste material shall be wetted and stored and transported to the authorized disposal site in leak-tight containers such as two plastic bags each with a minimum of a thickness of 6 mil., or fiber or metal drums.

(C) The waste transporter shall immediately notify the landfill operator upon arrival of the waste at the disposal site. Off-loading of [waste-containing] asbestos-containing waste material shall be done under the direction and supervision of the landfill operator.

(D) Off-loading of [waste-containing] asbestos-containing waste material shall occur at the immediate location where the waste is to be buried. The waste burial site shall be selected in an area of minimal work activity that is not subject to future excavation.

(E) Off-loading of [waste-containing] asbestos-containing waste material shall be accomplished in a manner that prevents the leak-tight transfer containers from rupturing and prevents visible emissions to the air.

(F) [Immediately after waste-containing a]Asbestos-containing waste material [is] deposited at a disposal site [, it] shall be covered with at least 2 feet of soil or 1 foot of soil plus 1 foot of other waste before compacting equipment runs over it but not later than the end of the operating day. [If other waste is used to cover the asbestos-containing material prior to compaction, the disposal area shall be covered with 1 foot of soil before the end of the operating day.]

(c) Rather than meet the requirements of this section, an owner or operator may elect to use an alternative disposal method which has received prior approval by the Department in writing.

(d)(A) All asbestos-containing waste material shall be sealed into containers labeled with a warning label that states:

OREGON ADMINISTRATIVE RULES
CHAPTER 340, DIVISION 25 - DEPARTMENT OF ENVIRONMENTAL QUALITY

ASBESTOS ABATEMENT REQUIREMENTS
excerpted from
Emission Standards and Procedural
Requirements for Hazardous Air Contaminants

Policy

340-25-450 The Commission finds and declares that certain air contaminants for which there is no ambient air standard may cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness, and are therefore considered to be hazardous air contaminants. Air contaminants currently considered to be in this category are asbestos, beryllium, and mercury. Additional air contaminants may be added to this category provided that no ambient air standard exists for the contaminant, and evidence is presented which demonstrates that the particular contaminant may be considered as hazardous. It is hereby declared the policy of the Department that the standards contained herein and applicable to operators are to be minimum standards, and as technology advances, conditions warrant, and Department or regional authority rules require or permit, more stringent standards shall be applied.

Definitions

340-25-455 As used in this rule, and unless otherwise required by context:

(1) "Asbestos" means...the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite."

(2) "Asbestos-containing waste material" means any waste which contains commercial asbestos and is generated by a source subject to the provisions of this subpart, or friable asbestos material including, but not limited to, asbestos mill tailings, control device asbestos waste, friable asbestos waste material, asbestos abatement project waste, and bags or containers that previously contained commercial asbestos.

(3) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or disposal of any material with the potential of releasing asbestos fibers from asbestos-containing material into the air."

NOTE: an asbestos abatement project is not considered to be a source under OAR 340-25-460(2) through (6). Emergency fire fighting is not an asbestos abatement project.

(5) "Asbestos-containing material" means asbestos or any material

containing at least 1% asbestos by weight, including particulate asbestos material.

(12) "Commercial asbestos" means any variety of asbestos which is produced by extracting asbestos from asbestos ore.

(13) "Commission" means the Environmental Quality Commission.

(14) "Demolition" means the wrecking or removal of any structural member of a facility together with related handling operations.

(15) "Department" means the Department of Environmental Quality.

(16) "Director" means the Director of the Department or regional authority and authorized deputies or officers.

(17) "Facility" means all or part of any public or private building, structure, installation, equipment, or vehicle or vessel, including but not limited to ships.

(18) "Friable asbestos material" means any asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry."

(19) "HEPA filter" means a high efficiency particulate air filter capable of filtering 0.3 micron particles with 99.97 percent efficiency.

(20) "Hazardous air contaminant" means any air contaminant considered by the Department or Commission to cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness and for which no ambient air standard exists.

(25) "Particulate asbestos material" means any finely divided particles of asbestos material.

(26) "Person" means any individual, corporation, association, firm, partnership, joint stock company, public and municipal corporation, political sub-division, the state and agency thereof, and the federal government and any agency thereof.

(29) "Regional authority" means any regional air quality control authority established under the provisions of ORS 468.505.

(30) "Renovation" means altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or removed are excluded.

(31) "Small-scale asbestos abatement project" means any asbestos abatement project which meets the definition given in OAR 340-33-020(17).

(33) "Structural member" means any load-supporting member of a facility, such as beams and load-supporting walls; or any non-supporting member, such as ceilings and non-load-supporting walls.

340-25-460(1) Applicability. The provisions of these rules shall apply to any source which emits air contaminants for which a hazardous air contaminant standard is prescribed. Compliance with the provisions of these rules shall not relieve the source from compliance with other applicable rules of the Oregon Administrative Rules, Chapter 340, or with applicable provisions of the Oregon Clean Air Implementation Plan.

(7) Delegation of authority. The Commission may, when any regional authority requests and provides evidence demonstrating its capability to carry out the provisions of these rules relating to hazardous contaminants, authorize and confer jurisdiction within its boundary until such authority and jurisdiction shall be withdrawn for cause by the Commission.

Emission Standards and Procedural Requirements for Asbestos

340-25-465 (4) Asbestos abatement projects. All persons intending to conduct or provide for the conduct of an asbestos abatement project shall comply with the requirements set forth in OAR 340-25-465(5), (6), and (7). The following asbestos abatement projects are exempt from these requirements:

(a) Asbestos abatement conducted in a private residence which is occupied by the owner and the owner-occupant performs the asbestos abatement.

(b) Removal of vinyl asbestos floor tile that is not attached by asbestos-containing cement, exterior asbestos roofing shingles, exterior asbestos siding, asbestos-containing cement pipes and sheets, and other materials approved by the Department provided that the materials are not caused to become friable or to release asbestos fibers. Precautions taken to ensure that this exemption is maintained may include but are not limited to:

(A) Asbestos-containing materials are not sanded, or power sawn or drilled;

(B) Asbestos-containing materials are removed in the largest sections practicable and carefully lowered to the ground;

(C) Asbestos-containing materials are handled carefully to minimize breakage throughout removal, handling, and transport to an authorized disposal site.

(D) Asbestos-containing materials are wetted prior to removal and during subsequent handling, to the extent practicable.

(c) Removal of less than 0.5 square feet of friable asbestos-containing material provided that the removal of asbestos is not the primary objective and the following conditions are met:

(A) The generation of particulate asbestos material is minimized.

(B) No vacuuming or local exhaust ventilation and collection is conducted with equipment having a collection efficiency lower than that of a HEPA filter.

(C) All asbestos-containing waste materials shall be cleaned up using HEPA filters or wet methods.

(D) Asbestos-containing materials is wetted prior to removal and during subsequent handling, to the extent practicable.

(E) An asbestos abatement project shall not be subdivided into smaller sized units in order to qualify for this exemption.

(d) Removal of asbestos-containing materials which are sealed from the atmosphere by a rigid casing, provided that the casing is not broken or otherwise altered such that asbestos fibers could be released during removal, handling, and transport to an authorized disposal site.

Note: The requirements and jurisdiction of the Department of Insurance and Finance, Accident Prevention Division and any other state agency are not affected by these rules.

(5) Notification Requirements. Written notification of any asbestos abatement project shall be provided to the Department on a Department form. The notification must be submitted by the facility owner or operator or by the contractor in accordance with one of the procedures specified in subsection (a), (b), or (c) below except as provided in subsections (e), (f), and (g) below.

(a) Submit the notifications as specified in subsection (d) below and the project notification fee to the Department at least ten days before beginning any asbestos abatement project.

(A) The project notification fee shall be:

(i) Twenty-five dollars ($25) for each small-scale asbestos abatement project.

(ii) Fifty dollars ($50) for each project greater than a small-scale asbestos abatement project and less than 260 linear feet or 160 square feet.

(iii) Two-hundred dollars ($200) for each project greater than 260 linear feet or 160 square feet, and less than 2600 linear feet or 1600 square feet.

(iv) Five hundred dollars ($500) for each project greater than 2600 linear feet or 1600 square feet.

(B) Project notification fees shall be payable with the completed project notification form. No notification will be considered to have occurred until the notification fee is submitted.

(C) Notification of less than ten days is permitted in case of an emergency involving protection of life, health or property. Notification shall include the information contained in subsection (d) below, and the date of the contract if applicable. If original notification is provided by phone, written notification and the project notification fee shall be submitted within three (3) days after the start of the emergency abatement.

(D) The Department must be notified prior to any changes in the scheduled starting or completion dates or other substantial changes or the notification will be void.

(b) For small-scale asbestos abatement projects conducted at one facility, the notification may be submitted as follows:

(A) Establish eligibility for use of this notification procedure with the Department prior to use;

(B) Maintain on file with the Department a general asbestos abatement plan. The plan shall contain the information specified in subsections (d)(A) through (d)(I) below, to the extent possible;

(C) Provide to the Department a summary report of all small-scale asbestos abatement projects conducted at the facility in the previous three months by the 15th day of the month following the end of the calendar quarter. The summary report shall include the information specified in subsections (d)(J) through (d)(M) below for each project, a description of any significant variations from the general asbestos abatement plan; and a description of asbestos abatement projects anticipated for the next quarter;

(D) Submit a project notification fee of two-hundred dollars per year ($200/year) prior to use of this notification procedure and annually thereafter while this procedure is in use.

(E) Failure to provide payment for use of this notification procedure shall void the general asbestos abatement plan and each subsequent abatement project shall be individually assessed a project notification fee.

(c) For small-scale asbestos abatement projects conducted by a contractor at one or more facilities, the notification may be submitted as follows:

(A) Establish eligibility for use of this procedure with the Department prior to use;

(B) Maintain on file with the Department a general asbestos abatement plan containing the information specified in subsections (d)(A) through (d)(G), to the extent possible;

(C) Provide to the Department a monthly summary of all small-scale projects performed by the 15th day of the following month including the information specified in subsections (d)(H) through (d)(M) below and a description of any significant variations from the general asbestos abatement plan for each project;

(D) Provide to the Department, upon request, a list of asbestos abatement projects which are scheduled or are being conducted at the time of the request; and

(E) Submit a notification fee of $25 per monthly summary prior to the use of this notification procedure.

(F) Failure to provide payment for use of this notification procedure shall void the general asbestos abatement plan and each subsequent abatement project shall be individually assessed a project notification fee.

(d) The following information shall be provided for each notification:

(A) Name and address of person intending to engage in asbestos abatement.

(B) Contractor's Oregon asbestos abatement license number, if applicable, and certification number of the supervisor for full-scale asbestos abatement or certification number of the trained worker for a project which does not have a certified supervisor.

(C) Method of asbestos abatement to be employed.

(D) Procedures to be employed to insure compliance with OAR 340-25-465.

(E) Names, addresses, and phone numbers of waste transporters.

(F) Name and address or location of the waste disposal site where the asbestos-containing waste material will be deposited.

(G) Description of asbestos disposal procedure.

(H) Description of building, structure, facility, installation, vehicle, or vessel to be demolished or renovated, including address or location where the asbestos abatement project is to be accomplished.

(I) Facility owner's or operator's name, address and phone number.

(J) Scheduled starting and completion dates of asbestos abatement work.

(K) Description of the asbestos type, approximate asbestos content (percent), and location of the asbestos-containing material.

(L) Amount of asbestos to be abated: linear feet, square feet, thickness.

(M) Any other information requested on the Department form.

(e) No project notification fee shall be assessed for asbestos abatement projects conducted in the following residential buildings: site-built homes, modular homes constructed off site, condominium units, mobile homes, and duplexes or other multi-unit residential buildings consisting of four units or less. Project notification for a full-scale asbestos abatement project, as defined in OAR 340-33-020(14), in any of these residential buildings shall otherwise be in accordance with subsection (5)(a) of this section. Project notification for a small-scale asbestos abatement project, as defined in OAR 340-33-020(17), in any of these residential buildings is not required.

(f) The project notification fees specified in this section shall be increased by 50% when an asbestos abatement project is commenced without filing of a project notification and/or submittal of a notification fee.

(g) The Director may waive part or all of a project notification fee. Requests for waiver of fees shall be made in writing to the Director, on a case-by-case basis, and be based upon financial hardship. Applicants for waivers must describe the reason for the request and certify financial hardship.

(h) Pursuant to ORS 468.535, a regional authority may adopt project notification fees for asbestos abatement projects in different amounts than are set forth in this rule. The fees shall be based upon the costs of the regional authority in carrying out the delegated asbestos program. The regional authority may collect, retain, and expend such project notification fees for asbestos abatement projects within its jurisdiction.

(6) Work practices and procedures. The following procedures shall be employed during an asbestos abatement project to prevent emissions of particulate asbestos material into the ambient air:

(a) Remove friable asbestos materials before any wrecking or dismantling that would break up the materials or preclude access to the materials for subsequent removal. However, friable asbestos materials need not be removed before demolition if:

(A) They are on a facility component that is encased in concrete or other similar material; and

(B) These materials are adequately wetted whenever exposed during demolition.

(b) Adequately wet friable asbestos materials when they are being removed. In renovation, maintenance, repair, and construction operations, wetting that would unavoidably damage equipment is not required if the owner or operator:

(A) Demonstrates to the Department that wetting would unavoidably damage equipment, and

(B) Uses a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the asbestos abatement project.

(c) When a facility component covered or coated with friable asbestos materials is being taken out of the facility as units or in sections:

(A) Adequately wet any friable asbestos materials exposed during cutting or disjointing operation; and

(B) Carefully lower the units or sections to ground level, not dropping them or throwing them.

(d) For friable asbestos materials being removed or stripped:

(A) Adequately wet the materials to ensure that they remain wet until they are disposed of in accordance with OAR 340-25-465(13); and

(B) Carefully lower the materials to the floor, not dropping or throwing them; and

(C) Transport the materials to the ground via dust-tight chutes or containers if they have been removed or stripped above ground level and were not removed as units or in sections.

(e) If a facility is being demolished under an order of the State or a local governmental agency, issued because the facility is structurally unsound and in danger of imminent collapse, the requirements of subsections (a), (b), (c), (d), and (f) of this section shall not apply, provided that the portion of the facility that contains friable asbestos materials is adequately wetted during the wrecking operation.

(f) None of the operations in subsections (a) through (d) of this section shall cause any visible emissions. Any local exhaust ventilation and collection system or other vacuuming equipment used during an asbestos abatement project, shall be equipped with a HEPA filter or other filter of equal or greater collection efficiency.

(g) Contractors licensed and workers certified to conduct only small-scale asbestos abatement projects under OAR 340-33 may use only those work practices and engineering controls specified by OAR 437 Appendix 83-G (Asbestos) (9/17/87) unless the Department authorizes other methods on a case-by-case basis.

(h) The Director may approve, on a case-by-case basis, requests to use an alternative to a specific worker or public health protection requirement as provided by these rules for an asbestos abatement project. The contractor or facility owner or operator must submit in advance a written description of the alternative procedure which demonstrates to the Director's satisfaction that the proposed alternative procedure provides worker and public health protection equivalent to the protection that would be provided by the specific provision, or that such level of protection cannot be obtained for the asbestos abatement project.

(7) Related Work Practices and Controls
Work practices and engineering controls employed for asbestos abatement projects by contractors and/or workers who are not otherwise subject to the requirements of the Oregon Department of Insurance and Finance, Accident Prevention Division shall comply with the subsections of OAR Chapter 437 Division 83 which limit the release of asbestos-containing material or exposure of other persons. As used in this subsection the term employer shall mean the operator of the asbestos abatement project and the term employee shall mean any other person.

(13) Disposal of asbestos-containing waste material: The owner or operator of any source covered under the provisions of sections (3), (4), (8) or (11) of this rule or any other source of friable asbestos-containing waste material shall meet the following standards.

(a) There shall be no visible emissions to the outside air, except as provided in subsection (13)(c) of this section, during the collection; processing, including incineration; packaging; transporting; or deposition of any asbestos-containing waste material which is generated by such source.

(b) All asbestos-containing waste material shall be disposed of at a disposal site authorized by the Department. Records of disposal at an authorized landfill shall be maintained by the source for a minimum of three years and shall be made available upon request to the Department. For an asbestos abatement project conducted by a contractor licensed under OAR 340-33-040, the records shall be retained by the licensed contractor. For any other asbestos abatement project, the records shall be retained by the facility owner.

(A) Persons intending to dispose of asbestos-containing waste material shall notify the landfill operator of the type and volume of the waste material and obtain the approval of the landfill operator prior to bringing the waste to the disposal site.

(B) All asbestos-containing waste material shall be wetted and stored and transported to the authorized disposal site in leak-tight containers such as two plastic bags each with a minimum of a thickness of 6 mil., or fiber or metal drums.

(C) The waste transporter shall immediately notify the landfill operator upon arrival of the waste at the disposal site. Off-loading of asbestos-containing waste material shall be done under the direction and supervision of the landfill operator.

(D) Off-loading of asbestos-containing waste material shall occur at the immediate location where the waste is to be buried. The waste burial site shall be selected in an area of minimal work activity that is not subject to future excavation.

(E) Off-loading of asbestos-containing waste material shall be accomplished in a manner that prevents the leak-tight transfer containers from rupturing and prevents visible emissions to the air.

(F) Asbestos-containing waste material deposited at a disposal site shall be covered with at least 2 feet of soil or 1 foot of soil plus 1 foot of other waste before compacting equipment runs over it but not later than the end of the operating day.

(c) Rather than meet the requirements of this section, an owner or operator may elect to use an alternative disposal method which has received prior approval by the Department in writing.

(d)(A) All asbestos-containing waste material shall be sealed into containers labeled with a warning label that states:

DANGER

Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard
Avoid Breathing Airborne
Asbestos Fibers

(B) Alternatively, warning labels specified by the U.S. Environmental Protection Agency under 40 CFR 61.152(b)(1)(iv) (3/10/86) may be used.

(14) Any waste which contains nonfriable asbestos-containing material and which is not subject to subsection (13) of this rule shall be handled and disposed of using methods that will prevent the release of airborne asbestos-containing material.

(15) Open storage or accumulation of friable asbestos material or asbestos-containing waste material is prohibited.

OREGON ADMINISTRATIVE RULES
LICENSING AND CERTIFICATION REQUIREMENTS

ASBESTOS REQUIREMENTS

AUTHORITY, PURPOSE, & SCOPE

340-33-010 (1) Authority. These rules are promulgated in accordance with and under the authority of ORS 468.893.

(2) Purpose. The purpose of these rules is to provide reasonable standards for:

(a) training and licensing of asbestos abatement project contractors,

(b) training and certification of asbestos abatement project supervisors and workers,

(c) accreditation of providers of training of asbestos contractors, supervisors, and workers,

(d) administration and enforcement of these rules by the Department.

(3) Scope

(a) OAR 340-33-000 through -100 is applicable to all work, including demolition, renovation, repair, construction, or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling, or disposal of any material which could potentially release asbestos fibers into the air; except as provided in (b) and (c) below.

(b) OAR 340-33-000 through -100 do not apply to an asbestos abatement project which is exempt from OAR 340-25-465(4).

(c) OAR 340-33-010 through -100 do not apply to persons performing vehicle brake and clutch maintenance or repair.

(d) Full-scale asbestos abatement projects are differentiated from smaller projects. Small-scale asbestos abatement projects as defined by OAR 340-33-020(17) are limited by job size and include projects,

(A) where the primary intent is to disturb the asbestos-containing material and prescribed work practices are used, and

(B) where the primary intent is not to disturb the asbestos-containing material.

(e) OAR 340-33-000 through -100 provide training, licensing, and certification standards for implementation of OAR 340-25-465, Emission Standards and Procedural Requirements for Asbestos.

DEFINITIONS

340-33-020 As used in these rules,

(1) "Accredited" means a provider of asbestos abatement training courses is authorized by the Department to offer training courses that satisfy requirements for contractor licensing and worker training.

(2) "Agent" means an individual who works on an asbestos abatement project for a contractor but is not an employe of the contractor.

(3) "Asbestos" means the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

(4) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or

disposal of any asbestos-containing material with the potential of releasing asbestos fibers from asbestos containing material into the air.

Note: Emergency fire fighting is not an asbestos abatement project.

(5) "Asbestos-containing material" means any material containing more than one percent asbestos by weight, including particulate asbestos material.

(6) "Certified" means a worker has met the Department's training, experience, and/or quality control requirements and has a current certification card.

(7) "Contractor" means a person that undertakes for compensation an asbestos abatement project for another person. As used in this subsection, "compensation" means wages, salaries, commissions and any other form of remuneration paid to a person for personal services.

(8) "Commission" means the Environmental Quality Commission.

(9) "Department" means the Department of Environmental Quality.

(10) "Director" means the Director of the Department of Environmental Quality.

(11) "EPA" means the United States Environmental Protection Agency.

(12) "Facility" means all or part of any public or private building, structure, installation, equipment, or vehicle or vessel, including but not limited to ships.

(13) "Friable asbestos material" means any asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry.

(14) "Full-scale asbestos abatement project" means any removal, renovation, encapsulation, repair or maintenance of any asbestos-containing material which could potentially release asbestos fibers into the air, and which is not classified as a small-scale project as defined by (17) below.

(15) "Licensed" means a contracting entity has met the Department's training, experience, and/or quality control requirements to offer and perform asbestos abatement projects and has a current asbestos abatement contractor license.

(16) "Persons" means an individual, public or private corporation, nonprofit corporation, association, firm, partnership, joint venture, business trust, joint stock company, municipal corporation, political subdivision, the state and any agency of the state or any other entity, public or private, however organized.

(17) "Small-scale asbestos abatement project" means small-scale, short-duration projects as defined by (18) below, and/or removal, renovation, encapsulation, repair, or maintenance procedures intended to prevent asbestos containing material from releasing fibers into the air and which:

(a) Remove, encapsulate, repair or maintain less than 40 linear feet or 80 square feet of asbestos-containing material;

(b) Do not subdivide an otherwise full-scale asbestos abatement project into smaller sized units in order to avoid the requirements of these rules;

(c) Utilize all practical worker isolation techniques and other control measures; and

(d) Do not result in worker exposure to an airborne concentration of asbestos in excess of 0.1 fibers per cubic centimeter of air calculated as an eight (8) hour time weighted average.

(18) "Small-scale, short-duration renovating and maintenance activity"

means a task for which the removal of asbestos is not the primary objective of the job, including, but not limited to:

(a) Removal of quantities of asbestos-containing insulation on pipes;

(b) Removal of small quantities of asbestos-containing insulation on beams or above ceilings;

(c) Replacement of an asbestos-containing gasket on a valve;

(d) Installation or removal of a small section of drywall; or

(e) Installation of electrical conduits through or proximate to asbestos -containing materials.

Small-scale, short duration activities shall be limited to no more than 40 linear feet or 80 square feet of asbestos containing material. An asbestos abatement activity that would otherwise qualify as a full-scale abatement project shall not be subdivided into smaller units in order to avoid the requirements of these rules.

(19) "Trained worker" means a person who has successfully completed specified training and can demonstrate knowledge of the health and safety aspects of working with asbestos.

(20) "Worker" means an employe or agent of a contractor or facility owner or operator.

GENERAL PROVISIONS

340-33-030 (1) Persons engaged in the removal, encapsulation, repair, or enclosure of any asbestos-containing material which has the potential of releasing asbestos fibers into the air must be licensed or certified, unless exempted by OAR 340-33-010(3).

(2) An owner or operator of a facility shall not allow any persons other than those employees of the facility owner or operator who are appropriately certified or a licensed asbestos abatement contractor to perform an asbestos abatement project in or on that facility. Facility owners and operators are not required to be licensed to perform asbestos abatement projects in or on their own facilities.

(3) Any contractor engaged in a full-scale asbestos abatement project must be licensed by the Department under the provisions of OAR 340-33-040.

(4) Any person acting as the supervisor of any full-scale asbestos abatement project must be certified by the Department as a Supervisor for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050.

(5) Any worker engaged in or working on any full-scale asbestos abatement project must be certified by the Department as a Worker for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050, or as a Supervisor for Full-Scale Asbestos Abatement.

(6) Any contractor or worker engaged in any small-scale asbestos abatement project but not licensed or certified to perform full-scale asbestos abatement projects, must be licensed or certified by the Department as a Small-Scale Asbestos Abatement Contractor or a Worker for Small-Scale Asbestos Abatement, respectively under the provisions of OAR 340-33-040 and -050.

(7) Any provider of training which is intended to satisfy the licensing and certification training requirements of these rules must be accredited by the Department under the provisions of OAR 340-33-060.

(8) Any person licensed, certified, or accredited by the Department under the provisions of these rules shall comply with the appropriate provisions of OAR 340-25-465 and OAR 340-33-000 through -100 and maintain a current address on

file with the Department, or be subject to suspension or revocation of license, or certification, or accreditation.

(9) Asbestos abatement contractors and workers may perform asbestos abatement projects without a license or certificate until January 1, 1989. Thereafter, any contractor or worker engaged in an asbestos abatement project must be licensed or certified by the Department.

(10) The Department may accept evidence of violations of these rules from representatives of other federal, state, or local agencies.

(11) A regional air pollution authority which has been delegated authority under OAR 340-25-460(7) may inspect for and enforce against violations of licensing and certification regulations. A regional air pollution authority may not approve, deny, suspend or revoke a training provider accreditation, contractor license, or worker certification, but may refer violations to the Department and recommend denials, suspensions, or revocations.

(12) An extension of time beyond January 1, 1989, for mandatory contractor licensing, supervisor certification or worker certification may be approved by the Commission if:

(a) Adequate accredited training as required for any of the categories of licensing or certification is not available in the State, and

(b) There is a public health or worker danger created due to inadequate numbers of appropriately licensed or certified persons to properly perform asbestos abatement activities.

(13) Variances from these rules may be granted by the Commission under ORS 468.345.

CONTRACTOR LICENSING

340-33-040 (1) Contractors may be licensed to perform either of the following categories of asbestos abatement projects:

(a) Full-Scale Asbestos Abatement Contractors: All asbestos abatement projects, regardless of project size or duration, or

(b) Small-Scale Asbestos Abatement Contractor: Small-scale asbestos abatement projects.

(2) Application for licenses shall be submitted on forms prescribed by the Department and shall be accompanied by:

(a) Documentation that the contractor, or contractor's employee representative, is certified at the appropriate level by the Department:

(A) Full-scale Asbestos Abatement Contractor license: Certified Supervisor for Full-Scale Asbestos Abatement.

(B) Small-Scale Asbestos Abatement Contractor: Certified Worker for Small-Scale Asbestos Abatement.

(b) Certification that the contractor has read and understands the applicable Oregon and federal rules and regulations on asbestos abatement and agrees to comply with the rules and regulations.

(c) A list of all certificates or licenses, issued to the contractor by any other jurisdiction, that have been suspended or revoked during the past one (1) year, and a list of any asbestos-related enforcement actions taken against the contractor during the past one (1) year.

(d) List any additional project supervisors for full-scale projects and their certification numbers as Supervisors for Full-Scale Asbestos Abatement.

(e) Summary of asbestos abatement projects conducted by the contractor during the past 12 months.

(f) A license application fee.

(3) The Department will review the application for completeness. If the application is incomplete, the Department shall notify the applicant in writing of the deficiencies.

(4) The Department shall deny, in writing, a license to a contractor who has not satisfied the license application requirements.

(5) The Department shall issue a license to the applicant after the license is approved.

(6) The Department shall grant a license for a period of 12 months. Licenses may be extended during Department review of a renewal application.

(7) Renewals:

(a) License renewals must be applied for in the same manner as is required for an initial license.

(b) For renewal, the contractor or employee representative must have completed at least the appropriate annual refresher course.

(c) The complete renewal application shall be submitted no later than 60 days prior to the expiration date.

(8) The Department may suspend or revoke a license if the licensee:

(a) Fraudulently obtains or attempts to obtain a license.

(b) Fails at any time to satisfy the qualifications for a license or comply with the rules adopted by the Commission.

(c) Fails to meet any applicable state or federal standard relating to asbestos abatement.

(d) Permits an untrained or uncertified worker to work on an asbestos abatement project.

(e) Employs a worker who fails to comply with applicable state or federal rules or regulations relating to asbestos abatement.

(9) A contractor who has a license revoked may reapply for a license after demonstrating to the Department that the cause of the revocation has been resolved.

CERTIFICATION

340-33-050 (1) Workers on asbestos abatement projects shall be certified at one or more of the following levels:

(a) Certified Supervisor for Full-Scale Asbestos Abatement.

(b) Certified Worker for Full-Scale Asbestos Abatement.

(c) Certified Worker for Small-Scale Asbestos Abatement.

(2) Application for Certification-General Requirements.

(a) Applications shall be submitted to the provider of the accredited training course within thirty (30) days of completion of the course.

(b) Applications shall be submitted on forms prescribed by the Department and shall be accompanied by the certification fee.

(3) Application to be a Certified Supervisor for Full-Scale Asbestos Abatement shall include:

(a) Documentation that the applicant has successfully completed the Supervisor for Full-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document, and

(b) Documentation that the applicant has been certified as a Worker for Full-Scale Asbestos Abatement and has at least 3 months of full-scale asbestos abatement experience, including time on powered air purifying respirators and experience on at least five separate asbestos abatement projects. The Department shall have the authority to determine if any applicant's experience satisfies

those requirements. Applications for licenses submitted prior to January 1, 1989 shall not be required to include documentation of certification as a worker.

(4) Application to be a Certified Worker for Asbestos Abatement shall include:

(a) Documentation that the applicant to be a Certified Worker for Full-Scale Asbestos Abatement has successfully completed the Worker for Full-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document.

(b) Documentation that the applicant to be a Certified Worker for Small-Scale Asbestos Abatement has successfully completed the Worker for Small-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document.

(5) Training course providers shall issue certification to an applicant who has fulfilled the requirements of certification.

(6) Certification at all levels is valid for a period of twenty-four (24) months after the date of issue.

(7) Renewals

(a) Certification renewals must be applied for in the same manner as application for original certification.

(b) To gain renewal of certification, a Worker for Full-Scale Asbestos Abatement and a Supervisor for Full-Scale Asbestos Abatement must complete the appropriate annual refresher course no sooner than nine (9) months and no later than twelve (12) months after the issuance date of the certificate, and again no sooner than three (3) months prior to the expiration date of the certificate. A worker may apply in writing to the Department for taking refresher training at some other time than as specified by this paragraph for reasons of work requirements or hardship. The Department shall accept or reject the application in writing.

(c) To gain renewal of certification, a Worker for Small-Scale Asbestos Abatement must comply with the regulations on refresher training which are in effect at the time of renewal. Completion of an accredited asbestos abatement review class may be required if the Environmental Quality Commission determines that there is a need to update the workers' training in order to meet new or changed conditions.

(8) The Department may suspend or revoke a worker's certificate for failure to comply with any state or federal asbestos abatement rule or regulation.

(9) If a certification is revoked, the worker may reapply for another initial certification only after twelve (12) months from the revocation date.

(10) A current worker certification card shall be available for inspection at each asbestos abatement project site for each worker conducting asbestos abatement activities on the site.

TRAINING PROVIDER ACCREDITATION

340-33-060 (1) General

(a) Asbestos training courses required for licensing or certification under these rules may be provided by any person.

(b) Any training provider offering training in Oregon to satisfy these certification and licensing requirements must be accredited by the Department.

(c) Each of the different training courses which are to be used to fulfill training requirements shall be individually accredited by the Department.

(d) The training provider must satisfactorily demonstrate through application and submission of course agenda, faculty resumes, training manuals, examination materials, equipment inventory, and performance during on-site course audits by Department representatives that the provider meets the minimum requirements established by the Department.

(e) The training course sponsor shall limit each class to a maximum of thirty participants unless granted an exception in writing by the Department. The student to instructor ratio for hands-on training shall be equal to or less than ten to one (10:1). To apply for an exception allowing class size to exceed thirty, the course sponsor must submit the following information in writing to the Department for evaluation and approval prior to expanding the class size.

(A) The new class size limit,

(B) The teaching methods and techniques for training the proposed larger class,

(C) The protocol for conducting the written examination, and

(D) Justification for a larger class size.

(f) Course instructors must have academic credentials, demonstrated knowledge, prior training, or field experience in their respective training roles.

(g) The Department may require any accredited training provider to use examinations developed by the Department in lieu of the examinations offered by the training provider.

(h) Training providers seeking accreditation for courses conducted since January 1, 1987, may apply for accreditation of those course offerings as though they were applying for initial accreditation. Contractors and workers trained by these providers since January 1, 1987 may be eligible to use this prior training as satisfaction of the initial training required by these licensing and certification rules.

(i) The Department may require accredited training providers to pay a fee equivalent to reasonable travel expenses for one Department representative to audit any accredited course which is not offered in the State of Oregon for compliance with these regulations. This condition shall be an addition to the standard accreditation application fee.

(2) Application for Accreditation.

(a) Application for accreditation shall be submitted to the Department in writing on forms provided by the Department and attachments. Such applications shall, as a minimum, contain the following information:

A. Name, address, telephone number of the firm, individual(s), or sponsors conducting the course, including the name under which the training provider intends to conduct the training.

B. The type of course(s) for which approval is requested.

C. A detailed course outline showing topics covered and the amount of time given to each topic, including the hands-on skill training.

D. A copy of the course manual, including all printed material to be distributed in the course.

E. A description of teaching methods to be employed, including description of audio-visual materials to be used. The Department may, at its discretion, request that copies of the materials be provided for review. Any audio-visual materials provided to the Department will be returned to the applicant.

F. A description of the hands-on facility to be utilized including protocol for instruction, number of students to be accommodated, the number of instructors, and the amount of time for hands-on skill training.

G. A description of the equipment that will be used during both classroom lectures and hands-on training.

H. A list of all personnel involved in course preparation and presentation and a description of the background, special training and qualification of each, as well as the subject matter covered by each.

I. A copy of each written examination to be given including the scoring methodology to be used in grading the examination; and a detailed statement about the development and validation of the examination.

J. A list of the tuition or other fees required.

K. A sample of the certificate of completion and certification card label.

L. A description of the procedures and policies for re-examination of students who do not successfully complete the training course examination.

M. A list of any states or accrediting systems that approve the training course.

N. A description of student evaluation methods (other than written examination to be used) associated with the hands-on skill training, as applicable.

O. A description of course evaluation methods used by students.

P. Any restriction on attendance such as class size, language, affiliation, and/or target audience of class.

Q. A description of the procedure for issuing replacement certification cards to workers who were issued a certification card or certification card label by the training provider within the previous 12 months and whose cards have been lost or destroyed.

R. Any additional information or documentation as may be required by the Department to evaluate the adequacy of the application.

S. Accreditation application fee.

(b) Application for initial training course accreditation and course materials shall be submitted to the Department at least 45 days prior to the requested approval date.

(c) Upon approval of an initial or refresher asbestos training course, the Department will issue a certificate of accreditation. The certificate is valid for one year from the date of issuance.

(d) Application for renewal of accreditation must follow the procedures described for the initial accreditation. In addition, course instructors must demonstrate that they have maintained proficiency in their instructional specialty and adult training methods during the twelve (12) months prior to renewal.

(3) Denial, Suspension or Revocation of Certificate of Accreditation. The Director may deny, revoke or suspend an application or current accreditation upon finding of sufficient cause. Applicants and certificate holders shall also be advised of the duration of suspension or revocation and any conditions that must be met before certificate reinstatement. Applicants shall have the right to appeal the Director's determination through an administrative hearing in accordance with the provisions of OAR Chapter 340 Division 11. The following may be considered grounds for denial, revocation or suspension:

(a) False statements in the application, omission of required documentation or the omission of information.

(b) Failure to provide or maintain the standards of training required by these regulations.

(c) Failure to provide minimum instruction required by these regulations.

(d) Failure to report to the Department any change in staff or program which substantially deviates from the information contained in the

application.

(e) Failure to comply with the administrative tasks and any other requirement of these regulations.

(4) Training Provider Administrative Tasks. Accredited training providers shall perform the following as a condition of accreditation:

(a) Administer the training course examination only to those students who successfully complete the training course.

(b) Issue a numbered certificate to each students who successfully passes the training course examination. Each certificate shall include the name of the student, name of the course completed, the dates of the course and the examination, name of the training provider, a unique certificate number, and a statement that the student passed the examination.

(c) Issue a photo identification card to each student seeking initial or renewal certification who successfully completes the training course examination and meets all other requirements for certification. The photo identification card shall meet the Department specifications.

(d) Place a label on the back of the photo identification card of each student who successfully completes a refresher training course and examination as required to maintain certification. The label shall meet Department specifications.

(e) Provide to the Department within ten (10) calendar days of the conclusion of each course offering the name, address, telephone number, Social Security Number, course title and dates given, attendance record, exam scores, and course evaluation form of each student attending the course and the certification number, certification fee, and a photograph for each student certified. Record of the information shall be retained by the training provider for a period of three (3) years.

(f) Obtain advance approval from the Department for any changes in the course instructional staff, content, training aids used, facility utilized or other matters which would alter the instruction from that described in the approval application.

(e) Utilize and distribute as part of the course information or training aides furnished by the Department.

(f) Notify the Department in writing at least one week before a training course is scheduled to begin. The notification must include the date, time and address where the training will be conducted.

(g) Establish and maintain course records and documents relating to course accreditation application. Accredited training providers shall make records and documents available to the Department upon request. Training providers whose principle place of business is outside of the State of Oregon shall provide a copy of such records or documents within ten (10) business days of receipt of such a written request from the Department.

(h) Notify the Department prior to issuing a replacement certification card.

(i) Accredited training providers must have their current accreditation certificates at the location where they are conducting training.

GENERAL TRAINING STANDARDS

340-33-070 (1) Courses of instruction required for certification shall be specific for each of the certificate categories and shall be in accordance with Department guidelines. The topics or subjects of instruction which a person must

receive to meet the training requirements must be presented through a combination of lectures, demonstrations, and hands-on practice.

(2) Courses requiring hands-on training must be presented in an environment suitable to permit participants to have actual experience performing tasks associated with asbestos abatement. Demonstrations not involving individual participation shall not substitute for hands-on training.

(3) Persons seeking certification as a Supervisor for Full-Scale Asbestos Abatement shall successfully complete an accredited training course of at least four days as outlined in the DEQ Asbestos Training Guidance Document. The training course shall include lectures, demonstrations, at least six hours of hands-on training, individual respirator fit testing, course review, and a written examination consisting of multiple choice questions. Successful completion of the training shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training.

(4) Any person seeking certification as a Worker for Full-Scale Asbestos Abatement shall successfully complete an accredited training course of at least three days duration as outlined in the DEQ Asbestos Training Guidance Document. The training course shall include lectures, demonstrations, at least six hours of actual hands-on training, individual respirator fit testing, course review, and an examination of multiple choice questions. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training. The course shall adequately address the following topics:

(5) Any person seeking certification as a Worker for Small-Scale Asbestos Abatement shall complete at least a two day approved training course as outlined in the DEQ Asbestos Training Guidance Document. The small-scale asbestos abatement worker course shall include lectures, demonstrations, at least six hours of hands-on training, individual respirator fit testing, course review, and an examination of multiple choice questions. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training.

(6) Refresher training shall be at least one day duration for Certified Supervisors and Workers for Full-Scale Asbestos Abatement and at least three hours duration for Certified Workers for Small-Scale Asbestos Abatement. The refresher courses shall include a review of key areas of initial training, updates, and an examination of multiple choice questions as outlined in the DEQ Asbestos Training Guidance Document. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in any hands-on training.

(7) One training day shall consist of at least seven hours, of actual classroom instruction and hands-on practice.

PRIOR TRAINING

340-33-080 Successful completion of an initial training course not accredited by the Department may be used to satisfy the training and examination requirements of OAR 340-33-050 and OAR 340-33-060 provided that all of the following conditions are met.

(1) The Department determines that the course and examination requirements are equivalent to or exceed the requirements of OAR 340-33-050 and 340-33-060 and the asbestos training guidance document, for the level of certification sought. State and local requirements may vary.

(2) If the training was completed prior to January 1, 1987, the applicant must demonstrate to the Department that additional experience sufficient to maintain knowledge and skills in asbestos abatement has been obtained in the interim.

(3) The applicant who has received recognition from the Department for alternate initial training successfully completes an Oregon accredited refresher course and refresher course examination for the level of certification sought.

RECIPROCITY

340-33-090 The Department may develop agreements with other jurisdictions for the purposes of establishing reciprocity in training, licensing, and/or certification if the Department finds that the training, licensing and/or certification standards of the other jurisdiction are at least as stringent as those required by these rules.

FEES

340-33-100 (1) Fees shall be assessed to provide revenues to operate the asbestos control program. Fees are assessed for the following:

(a) Contractor Licenses
(b) Worker Certifications
(c) Training Provider Accreditation
(d) Asbestos Abatement Project Notifications

(2) Contractors shall pay a non-refundable license application fee of:

(a) Three hundred dollars ($300) for a one year Full-Scale Asbestos Abatement Contractor license.

(b) Two hundred dollars ($200) for a one year Small-Scale Asbestos Abatement Contractor license.

(3) Workers shall pay a non-refundable certification fee of:

(a) One hundred dollars ($100) for a two year certification as a certified Supervisor for Full-Scale Asbestos Abatement.

(b) Eighty dollars ($80) for a two year certification as a Certified Worker for Full-Scale Asbestos Abatement.

(c) Fifty dollars ($50) for a two year certification as a Certified Worker for Small-Scale Asbestos Abatement.

(4) Training Providers shall pay a non-refundable accreditation application fee of:

(a) One thousand dollars ($1000) for a one year accreditation to provide a course for training supervisors on Full-Scale projects.

(b) Eight hundred dollars ($800) for a one year accreditation to provide a course for training workers on Full-Scale projects.

(c) Five hundred dollars ($500) for a one year accreditation to provide a course for training workers on Small-Scale projects.

(d) Two hundred and fifty dollars ($250) for a one year accreditation to provide a course for refresher training for any level of certification.

(5) Requests for waiver of fees shall be made in writing to the Director, on a case-by-case basis, and be based upon financial hardship. Applicants for waivers must describe the reason for the request and certify financial hardship. The Director may waive part or all of a fee.

Note: The requirements and jurisdiction of the Department of Insurance and Finance, Accident Prevention Division and

any other state agency are not affected by these rules.

[illegible]

APD Admin. Order 3-1987

BEFORE THE DIRECTOR OF THE
DEPARTMENT OF INSURANCE AND FINANCE
OF THE STATE OF OREGON

FILED
SEP 17 1987
BARBARA ROBERTS
SECRETARY OF STATE

In the Matter of the Amendment of)
OAR Chapter 437, Oregon Occupational Safety and Health Code,)
Division 83, Construction, by the)
Amendment of Various Rules and)
Appendices, and the Adoption of)
Rule 437-83-7023, pertaining to)
Identification of Asbestos-Containing Material.)

ORDER OF ADOPTION

To All Interested Persons:

(1) The Director of the Department of Insurance and Finance, pursuant to the rulemaking authority in ORS 654.025(2) and ORS 656.726(3), and in accordance with the procedure provided by ORS 183.335, duly filed notice to amend OAR Chapter 437, Oregon Occupational Safety and Health Code, Division 83, Construction, by the amendment of various rules and appendices, and the adoption of Rule 437-83-7023, pertaining to the identification of asbestos-containing material. This notice was published in the Secretary of State's Administrative Rules Bulletin on September 1, 1987.

(2) The rules, as set forth in Exhibit "A," attached hereto, and hereby made a part of this order, are being amended and adopted for the following reasons:

A. The Federal Occupational Safety and Health Administration (OSHA) has made corrections to its Asbestos Standard for Construction and has extended the partial administrative stay pertaining to occupational exposure to non-asbestiform tremolite, anthophyllite, and actinolite. Oregon is required to provide equivalent protection for workers, and is therefore adopting the corrections and extending the administrative stay.

B. A definition will be added for "small scale, short duration operations." In the existing Asbestos Rules for Construction, small scale, short duration operations are discussed in Appendix 83-G, but not defined in the rules. This new provision in the rules (437-83-7005(17)) defines small scale, short duration operations.

C. Appendix G is designated as "non-mandatory" in the existing Asbestos Rules for Construction. However, the provisions of Appendix G are mandatory for employers engaging in construction work that is "small scale, short duration," as opposed to "full scale removal, renovation, or demolition." Therefore, the "non-mandatory" heading of Appendix G will be deleted. The introductory paragraph of Appendix G outlines the application of the appendix's requirements.

D. A provision (Rule 437-83-7023) to require the identification of asbestos-containing material prior to initiating construction work is being adopted into the Asbestos Rules for Construction. Knowledge of asbestos content of materials on the jobsite reduces the inadvertent exposure of employes to airborne asbestos fibers. This information assists the employer in planning for employe protection on the construction site.

(3) On August 24, 1987, the Notice of Proposed Amendment of Rules was mailed to those on the Department of Insurance and Finance mailing list established pursuant to OAR 436-01-000 and to those on the Department's distribution mailing list as their interest appeared.

(4) No written comments or requests for a public hearing regarding the filed Notice of Proposed Amendment of Rules have been received.

(5) It is therefore:

ORDERED that OAR Chapter 437, Occupational Safety and Health Code, Division 83, Construction, amendment of various rules and appendices, and adoption of Rules 437-83-7005(17) and 7023, as set forth in Exhibit "A," attached hereto, and hereby made a part of this order, are adopted effective September 17, 1987.

It is hereby further ordered that, pursuant to ORS 183.715, a copy of these rules be filed with the Legislative Counsel within ten days after the certified copy of the adopted rules is filed with the Secretary of State.

The Citation of Statutory Authority, Statement of Need, Principal Documents Relied Upon and Statement of Fiscal Impact, as was required by ORS 183.335(2) for filing with the Notice of Intent, are set forth again as Exhibit "B" (a duplicate filing as requested by the Secretary of State), attached hereto and hereby made a part of this order.

Dated this 17th day of September, 1987.

Department of Insurance and Finance

Theodore R. Kulongoski, Director

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for APD Admin. Order 3-1987

EXHIBIT "B"

BEFORE THE DIRECTOR OF THE
DEPARTMENT OF INSURANCE AND FINANCE
OF THE STATE OF OREGON

FILED
AUG 13 1987
BARBARA ROBERTS
SECRETARY OF STATE

In the Matter of the Amendment of OAR Chapter 437, Oregon Occupational Safety and Health Code, Division 83, Construction, by the Amendment of Various Rules and Appendices, and the Adoption of Rule 437-83-7023, Pertaining to Identification of Asbestos-Containing Material.	)	STATUTORY AUTHORITY, STATEMENT OF NEED, PRINCIPAL DOCUMENTS RELIED UPON, AND STATEMENT OF FISCAL IMPACT

FILED
SEP 17 1987
BARBARA ROBERTS
SECRETARY OF STATE

1. Citation of Statutory Authority: ORS 654.025(2) and ORS 656.726(3).

2. Need for Rules:

These amendments and adoption are proposed for the following reasons:

A. The Federal Occupational Safety and Health Administration (OSHA) has made corrections to its Asbestos Standard for Construction and has extended the partial administrative stay pertaining to occupational exposure to non-asbestiform tremolite, anthophyllite, and actinolite. Oregon is required to provide equivalent protection for workers, and is therefore proposing to adopt the corrections and extend the administrative stay.

B. A definition is proposed to be added for "small scale, short duration operations." In the existing Asbestos Rules for Construction, small scale, short duration operations are discussed in Appendix 83-G, but not defined in the rules. This new provision in the rules (437-83-7005(17)) defines small scale, short duration operations.

C. Appendix G is designated as "non-mandatory" in the existing Asbestos Rules for Construction. However, the provisions of Appendix G are mandatory for employers engaging in construction work that is "small scale, short duration," as opposed to "full scale removal, renovation, or demolition." Therefore, the "non-mandatory" heading of Appendix G is proposed to be deleted. The introductory paragraph of Appendix G outlines the application of the appendix's requirements.

D. A provision (Rule 437-83-7023) to require the identification of asbestos-containing material prior to initiating construction work is being proposed for adoption into the Asbestos Rules for Construction. Knowledge of asbestos content of materials on the jobsite reduces the inadvertent exposure of employes to airborne asbestos fibers. This information assists the employer in planning for employe protection on the construction site.

3. Principal Documents Relied Upon:

A. OAR 437, Division 83, Construction (State Code).

B. 29 CFR 1926.58 Construction (Federal Standard).

C. Federal Register, Vol. 52, No. 83, issued 4/30/87, pp.15722-15723.

D. Memorandum from Federal OSHA dated 4/30/87, pertaining to "Exposure to Asbestos, Tremolite, Anthophyllite and Actinolite: Corrections Approval, and Information Collection Requirements."

The above documents are available for public inspection in the Department of Insurance and Finance offices, Room 204, Labor and Industries Building, Summer and Chemeketa Streets NE, Salem, Oregon, between 8 a.m. and 5 p.m. on normal working days, Monday through Friday.

4. Fiscal and Economic Impact:

The fiscal impact statement for these rules is made in accordance with the statutory requirements found in ORS 183.335. This statement takes into account the economic effect on agencies, units of local government, private sector employers, and small businesses.

The fiscal impact statement provided with the adoption of the Asbestos Rules for Construction (WCD Admin Order, Safety 1-1987) is also valid for these proposed amendments, with the exception of Rule 437-83-7023.

Rule 437-83-7023 requires an evaluation to be made to determine if asbestos is present in materials that will be handled in the construction work. This rule does not necessarily require laboratory analyses to be done, but rather an evaluation of information regarding the materials involved in the construction work. If laboratory analyses are used in the evaluation procedure, costs for assessment of bulk samples range from $30.00 to $50.00 per sample.

Dated this 13th day of August, 1987.

Department of Insurance and Finance

Theodore R. Kulongoski, Director

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FF, GG 700

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OREGON OCCUPATIONAL SAFETY AND HEALTH CODE

(Oregon Administrative Rules, Chapter 437)

Division 129

PROTECTIVE EQUIPMENT, APPAREL, AND RESPIRATORS

Effective November 1, 1975

ACCIDENT PREVENTION DIVISION
DEPARTMENT OF INSURANCE AND FINANCE
Salem, Oregon 97310

The Oregon Department of Insurance and Finance adopted these rules pursuant to ORS 654.025(2).

The Secretary of State designated OAR Chapter 437 as the "Oregon Occupational Safety and Health Code." Individual subjects within this code are designated as "Divisions."

Rules in this division of the Oregon Occupational Safety and Health Code are numbered in a uniform system developed by the Secretary of State. This system does not number the rules in sequence (001, 002, 003, etc.). Omitted numbers may be assigned to new rules at the time of their adoption.

A list of all occupational safety and health codes for the State of Oregon is available upon request.

To obtain this list or copies of these codes, address:

Accident Prevention Division
Department of Insurance and Finance
Room 21, Labor and Industries Building
Salem, Oregon 97310

The rules referenced in this division are available for viewing in the Office of the Secretary of State, 121 State Capitol Building, Salem, Oregon 97310, or the Central Office, Accident Prevention Division of the Department of Insurance and Finance, 1st Floor, Labor and Industries Building, Salem, Oregon 97310.

Oregon Administrative Rules are arranged in the following Basic Codification Structure adopted by the Secretary of State:

Chapter	Division	Rule	Section	Subsection	Paragraphs
437	40	010	(1)	(a)	(A) (i) (I) (a) (A) (i) (I)

NOTE: Date at the bottom of each page reflects the effective date of the most recent rule amendment on that page.

A vertical line in the margin indicates a rule has been amended since the last printing of this codebook. Insert pages with amended rules will also contain vertical lines to identify changed areas.

OAR 437

DIVISION 129

PROTECTIVE EQUIPMENT, APPAREL, AND RESPIRATORS

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DIVISION 129

PROTECTIVE EQUIPMENT, APPAREL, AND RESPIRATORS

[Ed. Note: Rules on protective equipment and apparel were first adopted as Chapter 22-069, Protective Equipment and Apparel, in part 22 of the Oregon Occupational Safety and Health Code by WCD Admin. Order, Safety 3-1975, filed 10/6/75, effective 11/1/75. Prior to this time, occupational health rules were administered by the Occupational Health Section of the Health Division, Department of Human Resources. As a direct result of the passage of the Oregon Safe Employment Act (OSEAct) in 1973, these occupational health rules were adopted by the Workmen's Compensation Board (later the Workers' Compensation Department).

Amended by WCD Admin. Order, Safety 4-1979, filed 5/21/79, effective 7/15/79.

Chapter 22-069, Protective Equipment and Apparel, was redesignated as Division 129, Protective Equipment, Apparel, and Respirators, and renumbered by WCD Admin. Order, Safety 5-1984, filed 6/18/84. Its effective date remains 11/1/75.]

Scope

437-129-004 (1) The control of those occupational diseases caused by breathing air contaminated with harmful dust, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination.

(2) This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and location ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to the following requirements.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.
WCD Admin. Order, Safety 5-1984, f. 6/18/84, ef. 11/1/75.

Protective Equipment and Apparel

437-129-010 (1) Workers are required to utilize all special protective equipment or apparel necessary during the period of exposure to harmful or hazardous conditions. Employers and employes shall familiarize themselves with the use, sanitary care and limitations of such equipment.

(2) All necessary protective equipment or apparel used shall be designed and fabricated so that during use the design or fabrication will not constitute a hazard.

(a) Personal protective equipment intended for reuse shall be of such quality as will permit sanitizing without impairment of protective efficiency.

(b) Each employer shall provide the means for sanitization and maintenance of equipment, and only personal protective equipment which has been sanitized shall be issued to workers after having been worn or used by another person, except that which is worn over outer clothing, and does not contact the skin of the wearer.

(3) In all operations where an extreme occupational health hazard will result from equipment failure, suitable personal protective equipment shall be provided at convenient locations throughout the work area. Additional equipment shall be kept in a location outside the area most likely to be affected, and readily available for emergency use.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Respirators, General Requirements

437-129-015 (1) Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employe.

(2) The employer shall provide the respirators which are applicable and suitable for the purpose intended.

(3) The employer shall be responsible for the establishment and maintenance of a respiratory protective program which shall include the requirements outlined in Rule 437-129-025.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Employe Responsibility

437-129-020 The employe shall use the provided respiratory protection in accordance with instructions and training received.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Requirements for a Minimal Acceptable Respiratory Protection Program

437-129-025 (1) Written standard operating procedures governing the selection and use of respirators shall be established.

(2) Respirators shall be selected on the basis of hazards to which the worker is exposed.

(3) The user shall be instructed and trained in the proper use of respirators and their limitations.

(4) Where practicable, the respirators should be assigned to individual workers for their exclusive use.

(5) Respirators shall be regularly cleaned and disinfected. Those issued for the exclusive use of one worker should be cleaned after each day's use, or more often

if necessary. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use.

(6) Respirators shall be stored in a convenient, clean, and sanitary location.

(7) Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use such as self-contained devices shall be thoroughly inspected at least once a month and after each use.

(8) Appropriate surveillance of work area conditions and degree of employe exposure or stress shall be maintained.

(9) There shall be regular inspection and evaluation to determine the continued effectiveness of the program.

(10) Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance annually).

(11) The respirator furnished shall provide adequate respiratory protection against the particular hazard as approved by the National Institute of Occupational Safety and Health (NIOSH). When NIOSH has not established approval mechanisms for a particular respiratory hazard, then other respirators may be accepted for use when proof of acceptable performance is made available.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Selection of Repirators

437-129-030 Proper selection of respirators shall be made according to the guidance of American National Standard Practices for Respiratory Protection Z88.2-1969.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Air Quality

437-129-035 (1) Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Oxygen shall meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen. Breathing air shall meet at least the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Commodity Specification G-7.1-1966. Compressed oxygen shall not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen must never be used with air line respirators.

(2) Breathing air may be supplied to respirators from cylinders or air compressors.

(a) Cylinders shall be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR Part 178).

(b) The compressor for supplying air shall be equipped with necessary safety and standby devices. A breathing air-type compressor shall be used. Compressors shall be constructed and situated so as to avoid entry of contaminated air into the system and suitable in-line air purifying sorbent beds and filters installed to further assure breathing air quality.

(c) A receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in event of compressor failure, and alarms to indicate compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high-temperature alarm is used, the air from the compressor shall be frequently tested for carbon monoxide to insure that it meets the specifications in section (1) of this rule.

(3) Air line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air line respirators with non-respirable gases or oxygen.

(4) Breathing gas containers shall be marked in accordance with American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained, 248.1-1954; Federal Specification BB-A-1034a, June 21, 1968, Air Compressed for Breathing Purposes; or Interim Federal Specification GG-B-00675b, April 27, 1965. Breathing Apparatus, Self-Contained.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Use of Respirators

437-129-040 (1) Standard procedures shall be developed for respirator use. These should include all information and guidance necessary for their proper selection, use, and care. Possible emergency and routine uses of respirators should be anticipated and planned for.

(2) The correct respirator shall be specified for each job. The respirator type is usually specified in the work procedures by a qualified individual supervising the respiratory protective program. The individual issuing them shall be adequately instructed to insure that the correct respirator is issued. Each respirator permanently assigned to an individual should be durably marked to indicate to whom it was assigned. This mark shall not affect the respirator performance in any way. The date of issuance should be recorded.

(3) Written procedures shall be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies. Personnel shall be familiar with these procedures and the available respirators.

(a) In areas where the wearer, with failure of the respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least one additional person shall be present. Communications (visual, voice, or signal line) shall be maintained between both or all individuals present. Planning shall be such that one individual will be unaffected by any likely incident and have the proper rescue equipment to be able to assist the other(s) in case of emergency.

(b) When self-contained breathing apparatus or hose masks with blowers are used in atmospheres immediately dangerous to life or health, standby workers must be present with suitable rescue equipment.

(c) Persons using airline respirators in atmospheres immediately hazardous to life or health shall be equipped with safety harnesses and safety lines for lifting or removing persons from hazardous atmospheres or other and equivalent provisions for the rescue of persons from hazardous atmospheres shall be used. A standby worker or workers with suitable self-contained breathing apparatus shall be at the nearest fresh air base for emergency rescue.

(4) Respiratory protection is no better than the respirator in use, even though it is worn conscientiously. Frequent random inspections shall be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned, and maintained.

(5) For safe use of any respirator, it is essential that the user be properly instructed in its selection, use and maintenance. Both supervisors and workers shall be so instructed by competent persons. Training shall provide the workers an opportunity to handle the respirator, have it fitted properly, test its face-piece-to-face seal, wear it in normal air for a long familiarity period, and, finally, wear it in a test atmosphere.

(a) Every respirator wearer shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly. Respirators shall not be worn when conditions prevent a good face seal. Such conditions may be a growth of beard, sideburns, a skull cap that projects under the facepiece, or temple pieces on glasses. Also, the absence of one or both dentures can seriously affect the fit of a facepiece. The worker's diligence in observing these factors shall be evaluated by periodic check. To assure proper protection, the facepiece fit shall be checked by the wearer each time he or she puts on the respirator. This may be done by following manufacturers' facepiece fitting instructions.

(b) Providing respiratory protection for individuals wearing corrective glasses is a serious problem. A proper seal cannot be established if the temple bars of eye glasses extend through the sealing edge of the full facepiece. As a temporary measure, glasses with short temple bars or without temple bars may be taped to the wearer's head. Systems have been developed for mounting corrective lenses inside full facepieces. When a worker must wear corrective lenses as part of the facepiece, the face and lenses shall be fitted by qualified individuals to provide good vision, comfort, and a gas-tight seal.

(c) If corrective spectacles or goggles are required, they shall be worn so as not to affect the fit of the facepiece. Proper selection of equipment will minimize or avoid this problem.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Maintenance and Care of Respirators

437-129-045 (1) A program for maintenance and care of respirators shall be adjusted to the type of plant, working conditions, and hazards involved, and shall include the following basic services:

(a) Inspection for defects (including a leak check);

(b) Cleaning and disinfecting;

(c) Repair;

(d) Storage. Equipment shall be properly maintained to retain its original effectiveness.

(2) Inspection:

(a) All respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in satisfactory working condition.

(b) Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be fully charged according to the manufacturer's instructions. It shall be determined that the regulator and warning devices function properly.

(c) Respirators inspection shall include a check of the tightness of connections and the condition of the facepiece, headbands, valves, connecting tube, and canisters. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber or elastomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage.

(d) A record shall be kept of inspection dates and findings for respirators maintained for emergency use.

(3) Cleaning and Disinfecting:

(a) Routinely used respirators shall be cleaned and disinfected as frequently as necessary to insure that proper protection is provided for the wearer. Each worker should be briefed on the cleaning procedure and be assured that he or she will always receive a clean and disinfected respirator. Such assurances are of greatest significance when respirators are not individually assigned to workers.

(b) Respirators maintained for emergency use shall be cleaned and disinfected after each use.

(4) Repairs:

(a) Replacement or repairs shall be done only by experienced persons with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair.

(5) Storage:

(a) After inspection, cleaning, and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in compartments built for the purpose. The compartments should be clearly marked. Routinely used respirators, such as dust respirators, may be placed in plastic bags. Respirators should not be stored in such places as lockers or tool boxes unless they are in carrying cases or cartons.

(b) Respirators should be packed or stored so that the facepiece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position.

(c) Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in "use and care" instructions usually mounted inside the carrying case lid.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Identification of Gas Mask Canisters

437-129-050 (1) The primary means of identifying a gas mask canister shall be by means of properly worded labels. The secondary means of identifying a gas mask canister shall be by a color code.

(2) All who issue or use gas masks falling within the scope of this rule shall see that all gas mask canisters purchased or used by them are properly labeled and colored in accordance with these requirements before they are placed in service and that the labels and colors are properly maintained at all times thereafter until the canisters have completely served their purpose.

(3) (a) On each canister shall appear in bold letters the following:

Canister for

____

(Name of atmospheric contaminant)

or

Type N Gas Mask Canister

(b) In addition, essentially the following wording shall appear beneath the appropriate phrase on the canister label: For respiratory protection in atmospheres containing not more than _______ percent by volume of ______________________________

____
(Name of atmospheric contaminant)

(4) Canisters having a special high-efficiency filter for protection against radionuclides and other highly toxic particulates shall be labeled with a statement of the type and degree of protection afforded by the filter. The label shall be affixed to the neck end of, or to the gray stripe which is around and near the top of, the canister. The degree of protection shall be marked as the percent of penetration of the canister by a 0.3-micron-diameter dioctyl phthalate (DOP) smoke at a flow rate of 85 liters per minute.

(5) Each canister shall be a label warning that gas masks should be used only in atmospheres containing sufficient oxygen to support life (at least 16 percent by volume), since gas mask canisters are only designed to neutralize or remove contaminants from the air.

(6) Each gas mask canister shall be painted a distinctive color or combination of colors indicated in Table I-1. All colors used shall be such that they are clearly identifiable by the user and clearly distinguishable from one another. The color coating used shall offer a high degree of resistance to chipping, scaling, peeling, blistering, fading, and the effects of the ordinary atmospheres to which they may be exposed under normal conditions of storage and use. Appropriately colored pressure sensitive tape may be used for the stripes.

TABLE I-1

Atmospheric contaminants to be protected against	**Colors assigned***
Acid gases	White
Hydrocyanic acid gas	White with 1/2-inch green stripe completely around the canister near the bottom.
Chlorine gas	White with 1/2-inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black
Ammonia gas	Green
Acid Gases amd Ammonia Gas	Green with 1/2-inch white stripe completely around the canister near the bottom.
Carbon monoxide	Blue
Acid gases and organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 1/2-inch blue stripe completely around the canister near the bottom.
Acid gases, organic vaors, and ammonia gases	Brown
Radioactive materials, excepting tritium and noble gases	Purple (Magenta)
Particulates (dust, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors	Canister color for contaminant, as designated above, with 1/2-inch gray stripe completely around the canister near the top.
All of the above atmospheric contaminants	Red with 1/2-inch gray stripe completely around the canister near the top.

*Gray should not be assigned as the main color for a canister designed to remove acids or vapors.

Note: Orange shall be used as a complete body, or stripe color to represent gases not included in this table. The user will need to refer to the canister label to determine the degree of protection the canister will afford.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.
WCB Admin. Order, Safety 4-1979, f. 5/21/79, ef. 7/15/79.

OREGON OCCUPATIONAL SAFETY AND HEALTH CODE

(Oregon Administrative Rules, Chapter 437)

Division 153

PIPE LABELLING

Effective October 1, 1987

ACCIDENT PREVENTION DIVISION
DEPARTMENT OF INSURANCE AND FINANCE
Salem, Oregon 97310

The Oregon Department of Insurance and Finance adopted these rules pursuant to ORS 654.025(2).

The Secretary of State designated OAR Chapter 437 as the "Oregon Occupational Safety and Health Code." Individual subjects within this code are designated as "Divisions."

Rules in this division of the Oregon Occupational Safety and Health Code are numbered in a uniform system developed by the Secretary of State. This system does not number the rules in sequence (001, 002, 003, etc.). Omitted numbers may be assigned to new rules at the time of their adoption.

A list of all occupational safety and health codes for the State of Oregon is available upon request.

To obtain this list or copies of these codes, address:

Accident Prevention Division
Department of Insurance and Finance
Room 21, Labor and Industries Building
Salem, Oregon 97310

The rules referenced in this division are available for viewing in the Office of the Secretary of State, 121 State Capitol Building, Salem, Oregon 97310, or the Central Office, Accident Prevention Division of the Department of Insurance and Finance, 1st Floor, Labor and Industries Building, Salem, Oregon 97310.

Oregon Administrative Rules are arranged in the following Basic Codification Structure adopted by the Secretary of State:

Chapter	Division	Rule	Section	Subsection	Paragraphs
437	40	010	(1)	(a)	(A) (i) (I) (a) (A) (i) (I)

NOTE: Date at the bottom of each page reflects the effective date of the most recent rule amendment on that page.

A vertical line in the margin indicates a rule has been amended since the last printing of this codebook. Insert pages with amended rules will also contain vertical lines to identify changed areas.

OAR 437

DIVISION 153

PIPE LABELLING

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OAR 437

DIVISION 153

PIPE LABELLING.

[Historical Note: OAR 437, **Division 153, Pipe Labelling,** was first adopted by WCD Admin. Order, Safety 8, 1986, filed 9/4/86, **effective 10/1/87.]**

GENERAL REQUIREMENTS

Scope and Application

437-153-004 This division shall apply to all piping systems containing hazardous substances or that use asbestos as a pipe insulation material in buildings, structures and workplaces. This division does not apply to buried piping.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Definitions

437-153-005 (1) Hazardous Substances: any substance which is a physical or health hazard.

(2) Health Hazard: a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employes. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosive sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes or mucous membranes.

(3) Physical Hazard: a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

(4) Piping System: includes pipes, single or multiple, of any kind and, in addition, valves and pipe coverings.

(5) Pipes: conduits for the transport of gases, liquids, semiliquids or fine particulate dusts.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Purpose

437-153-007 The purpose of this division is to prescribe minimum labelling requirements for all piping systems which contain hazardous substances, transport substances in a hazardous state, or which use asbestos as a pipe insulation material.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Labelling

437-153-010 (1) Pipes and piping systems which contain hazardous substances or transport substances in a hazardous state shall be labelled in accordance with subsections (a) (b) (c) and (d) or otherwise identified in accordance with subsection (e) of this rule.

(a) Positive identification of the hazardous contents of a piping system shall be by lettered labels. The label shall give the name of the contents in full or abbreviated form.

(b) Contents shall be identified by labelling with sufficient detail to identify the hazard.

(c) Label wording shall be brief, informative and simple.

(d) Labelling shall be accomplished by stencilling, the use of tape, adhesives, markers or approved alternative means.

(e) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual pipes, as long as the alternative method identifies the pipe(s) to which it is applicable and conveys the information required by this rule. The written materials shall be readily accessible to the employes in their work areas during each shift. (OAR 437, Division 155, Hazard Communication, OAR 437-155-020(6).)

(2) Pipes or piping systems which use asbestos as a pipe insulation material shall be labelled in accordance with subsection (a), or otherwise identified in accordance with subsection (b) of this rule (OAR 437-153-010(2)).

(a) The label for pipe insulation containing asbestos shall include the following:

DANGER
CONTAINS ASBESTOS FIBER
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(b) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual pipes, as long as the alternative method identifies the pipe(s) to which it is applicable and conveys the information required by this rule. The written materials shall be readily accessible to the employes in their work areas during each shift. (OAR 437, Division 155, Hazard Communication, OAR 437-155-020(6).)

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Location of Labelling

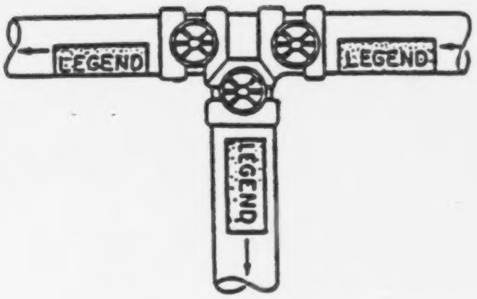
437-153-015 (1) Labelling shall be applied where confusion may occur, such as close to valves or flanges and adjacent to changes in direction, branches and where pipes pass through walls, floors or ceilings.

(2) Labelling shall be applied, at a minimum, at the beginning and end of continuous pipe runs.

(3) For asbestos insulation, labelling shall be at a minimum, on unobstructed continuous pipe runs, every 75 feet.

Illustration 1

LOCATION OF LABELLING



Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Visibility

437-153-025 (1) Where pipes are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal centerline of the pipe.

(2) Where pipes are inaccessible and/or at a distance which precludes clear identification of the letters on labelling, alternatives to the labelling which meet all other requirements of this rule may be used (i.e., schematics posted on walls in work areas).

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

APPENDIX A

(Non-Mandatory)

TABLE 1
CLASSIFICATION OF HAZARDS OF MATERIALS AND SUGGESTIONS OF COLORS

Classification	Color Field **	Color of Letters For Legends
Materials Inherently Dangerous		
Flammable or Explosive	Yellow	Black
Chemically Active or Toxic	Yellow	Black
Extreme Temperatures or Pressures	Yellow	Black
Radioactive	Yellow	Magenta
Materials of Inherently Low Hazard		
Liquid or Liquid Admixture	Green	White
Gas or Gaseous admixture	Blue	White

** Alternatives to the colors suggested by Table 1 may be acceptable if they meet all other requirements of this appendix and are used consistently on all pipes in a given location.

(1) Color may be displayed on the piping by any physical means, but when it is used it shall be in combination with labels.

(2) Color may be used in continuous, total length, or in intermittent displays.

Types and Sizes of Letters

(1) Contrast shall be provided between color field and letters for readability.

(2) Use of letters of block lettering in sizes 1/2 inch (13 mm) and larger, is recommended. (Table 2)

TABLE 2
TYPES AND STYLES OF LETTERS

Outside Diameter of Pipe or Covering		Length of Color Field		Size of Letters	
in.	mm.	in.	mm.	in.	mm.
3/4 to 1 1/4	19 to 32	8	200	1/2	13
1 1/1 to 2	38 to 51	8	200	3/4	19
2 1/2 to 6	64 to 150	12	300	1 1/4	32
8 to 10	200 to 250	24	600	2 1/2	64
over 10	over 250	32	800	3 1/2	89

(3) For identification of materials in pipes less than 3/4 inch (19 mm.) in diameter, and for value and fitting identification, the use of a legible tag is recommended.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Section 5: Personal Protective Equipment

Respiratory Protection

Section objectives: information in this section will allow the participants to:

1. Recognize the need for protective clothing for asbestos removal and maintenance activities.
2. Identify different types of protective clothing and the proper use protective clothing.
3. Understand the need for effective respiratory protection when working around asbestos.
4. Recognize the operating principles of respiratory protection.
5. Outline the classification of respirator types, uses, and working limitations.
6. Understand the importance of the proper use of, maintenance, and fit testing of respirators.
7. Understand the requirements and components of an effective respiratory protection program.

Section 5: Personal Protective Equipment

1. The Objectives of Worker Protection

   Personal protection

   Environmental protection

2. Medical Surveillance Program

   Who is required to have a medical surveillance program?

   Medical examinations

   Medical records

3. Basic Components for Worker Protection

   Hard hat

   Safety glasses

   Gloves

   Safety shoes/boots

Disposable clothing

Tyvk overalls, hoods, and foot coverings

Respirators

4. Respiratory Protection

When are respirators required?

5. Types of Respirators

Air-Purifying

Half Mask

Full Face

PAPR

HEPA filters

Air-Supplied

Self-Contained

Respirator Protection Factors

6. Respirator Fit-testing

When are respirators tested for proper fit?

Negative pressure check

Positive pressure check

Qualitative fit test

Quantitative fit test

7. The Respiratory Protection Program

Program administrator

Selection of proper respirators

Medical screening and fit-testing

Assigning and maintenance of respirators

Assessing work area conditions

Record keeping

8. Putting Protective Clothing On

Remove street clothes

Put on nylon swim suit

Put on disposable coveralls

Put on disposable foot coverings (if used)

Tape ankles of coveralls

Inspect, put on, and fit test respirator

Put on hood over respirator head straps

Pass airlock if enclosure is used

Put on safety shoes

Put on gloves and tape sleeves

Put on hard hat and safety glasses

9. Removing Protective Clothing

Small-scale projects

Keep respirator on

HEPA vacuum or wet-wipe clothing

Remove disposible clothing

HEPA vacuum or wet-wipe reusable equipment

Remove and clean respirator, install new cartridges

Large-scale projects

Keep respirator on

Remove contaiminated clothing and equipment before shower

Discard disposable clothing and clean reusable equipment

Proceed to decon-shower with respirator on

Go to clean room and dress in street clothes

Clean, disinfect, and inspect respirator; install new cartridges

THE IMPORTANCE OF MEDICAL SURVEILLANCE

It is important for all asbestos abatement contractors to establish an ongoing medical surveillance program for several reasons. The three major areas of concern are:

1. The safety and health of all employees
2. Regulatory requirements
3. Other legal liability concerns

Through implementation of a sound medical surveillance program, an abatement contractor will be able to verify every employee's medical status at a particular time, comply with OSHA standards on medical surveillance of workers exposed to asbestos, and also, to reduce other possible liability risks. In this section, these three concerns are addressed, in addition to several other considerations associated with medical surveillance programs.

Who Needs Medical Surveillance?

Because of the increased public awareness concerning the hazards associated with exposure to airborne asbestos fibers, and because of various regulatory requirements, employers and building owners are finding themselves in situations where they must provide for regular and periodic medical surveillance for their employees. Asbestos abatement contractors are required to provide a medical surveillance program for their employees since they are regularly exposed to airborne asbestos fibers. For these employees, a medical surveillance program is used to determine their baseline health status (health status before beginning work), to monitor their health during the duration of their employment/project, and also to provide documentation of their health status along with their work history upon completion of their employment/project.

Other employees that should be provided medical surveillance are custodial and maintenance workers who may encounter asbestos-containing materials while performing their normal duties. Examples of these duties might include working above false ceilings with asbestos-containing insulation, installing ceiling tiles, or performing maintenance on pipes or boilers that have asbestos-containing insulation on them. By law, any employees working in a building in which the airborne fiber concentrations exceed 0.1 fibers per cubic centimeter (f/cc) during an 8 hour time weighted average (TWA), are required to undergo medical surveillance with the cost to be borne by the employer/building owner. Additionally, any employee who wears a respirator as a routine part of their job, must also be medically evaluated on a regular basis. This is to ensure that the use of the respirator does not adversely affect his or her health.

OSHA Standards -- Medical Surveillance

According to the OSHA asbestos standard, 29 CFR 1910.1001, subpart J, the employer/building owner must provide, at his/her own expense, medical examinations relative to their employees' exposure to asbestos. An acceptable medical surveillance program must include pre-placement, annual, and termination examinations provided there is sufficient evidence that demonstrates that an employee has not been examined in accordance with the standard within the past one-year period. This standard also outlines the requirements for maintaining medical records on each employee.

Pre-Placement Exams

According to the OSHA standards pre-placement examinations must take place within 30 calendar days following the worker's first employment. A comprehensive medical evaluation must be performed. This should include, as a minimum, a chest x-ray (posterior-anterior 14 x 17 inches), a medical history to determine the presence of any possible respiratory diseases, and pulmonary function tests including forced vital capacity (FVC) (the maximum amount of air that can be expired from the lung after full inhalation), and forced expiratory volume after one second ($FEV_{1.0}$) (the amount of air forcibly expired in one second after full inhalation).

The results of this examination will be used as the employee's baseline health status, and also to determine whether or not they are capable of wearing respirators. A physician's report will then be furnished to the employer/building wner for their files. If an employee requests to see the report, the employer/building owner is required to supply them with a copy. It would also be considered good practice to explain the report to the individual employee. Individual test results are normally kept by the physician or clinic to maintain confidentiality.

It is very important for the employer to be sure the clinic maintains the results of the examination on file. In the event an employee files suit at some future date claiming a disability, the employer/ building owner will be able to check their records and prove whether or not the condition could have occurred as a result of employment with their company.

In addition to the medical reports, the employer/ building owner should request that the physician provide a statement indicating whether or not an employee is capable of wearing a respirator, and also outlining any limitations associated with their use. This form should also indicate any other limitations (i.e., intense heat, extreme cold, etc.).

Annual Examinations

According to OSHA 29 CFR 1910.1001, subpart (J)(3), every employer must provide, or make available, comprehensive medical evaluations to each of their employees engaged in occupations which cause exposure to airborne asbestos fibers (i.e., abatement workers, maintenance people, etc.). Such annual examinations must include, as a minimum, a chest x-ray (posterior-anterior 14 x 17 inches), a study to determine the presence of any respiratory diseases, a pulmonary function test which includes FVC and

$FEV_{1.0}$. (Note: Many physicians recommend fewer x-rays than every year. It is important to consult your clinic on this matter, but recognize that OSHA currently requires annual x-ray examinations. This examination is basically the same as the pre-placement evaluation, and is used primarily as an ongoing surveillance mechanism.

The physician will be able to compare the annual examinations with the pre-placement evaluations to determine if there are any changes in an employee's health status. If there are noticeable changes, the employer and the employee should both be notified since the situation may require immediate action (i.e., transfer to another job, discontinue respirator use, etc.).

Annual examinations, in most cases, will be most applicable to custodial or maintenance workers who work in a building, and are not engaged in full-time asbestos-related work. With the exception of a long duration project (over 1 year), or an abatement contractor that continually uses the same employees on abatement jobs, most of the people used on an asbestos removal project are temporary workers, and thus annual monitoring would not be possible. Temporary workers, in particular, should be encouraged to obtain and preserve copies of their medical records.

Termination of Employment Examination

Within 30 calendar days before or after the termination of an employee, OSHA requires that each employee exposed to asbestos receive a medical examination. This examination must entail the same items as the pre-placement and annual exams. There must be a chest x-ray (posterior -- anterior 14 x 17 inches), a history to determine the presence of any respiratory diseases, and pulmonary function testing including FVC and $FEV_{1.0}$. Records of these exams must be retained by the employer/building owner for a minimum period of 30 years to provide documentation of the health status of the employee. The reason for this 30 year period is because the latency period associated with asbestos-related diseases often ranges between 15-30 years. Thus, if an employee files a claim 25 years later, the employer will have records on file for reference.

Working and breathing in some environments can pose a hazard to workers' health. Inhalation of some substances can cause immediate or quick injury to the respiratory system or other major organ systems of the body. Carbon monoxide and some paint solvents are examples of relatively quick-acting substances. The injuries/illnesses caused by other contaminants may not be obvious for years or even decades. Asbestos and other cancer-causing agents fall into this category of long latency (developing) periods.

Respirators are commonly used to help protect against these inhalation hazards, especially on asbestos abatement projects. However, the protection program is not nearly as simple as choosing a respirator, giving it to an employee, and expecting them to get adequate protection. There is a need to have and apply knowledge about lung structure and function; hazard recognition, evaluation and control; government regulations; and human characteristics.

There are three ways hazardous materials can enter the body:

- Through the gastrointestinal (GI) tract

- Through the skin (or cause harmful effects to the skin)

- Through the respiratory system

Fortunately, asbestos does not appear to pose any significant degree of hazard through the skin and GI routes of entry. Unfortunately, it can cause several diseases when it enters through the lungs.

The respiratory system is a gaseous (air) pump with a series of airways leading from the nose and mouth down into the air sacs (alveoli) where there is an exchange of oxygen and carbon dioxide. At the air sacs, oxygen enters the blood and carbon dioxide exits the blood.

The main components of the respiratory system going from top to bottom are:

- Nose
- Mouth
- Throat
- Larynx (voice box)
- Trachea ("windpipe")

- Bronchi (branches from trachea)
- Alveoli (air sacs)
- Diaphragm and chest muscles

Airways of the upper respiratory tract (trachea through bronchi) are lined with cilia -- hair-like protrusions covered with a sheet of mucous. These cilia are constantly sweeping upward quickly, then down slowly, and thus moving the mucous and trapped materials up at a rate of approximately one inch per minute. This is an important clearance mechanism which serves to remove large particulate matter from the lungs. Particles are brought back up to the throat where they are swallowed or expectorated.

Unfortunately, smoking retards this cleansing mechanism of the lungs by causing paralysis of the cilia. A few "puffs" on a cigarette drastically reduces the cilia motion. Smoking several cigarettes retards the cilia for several hours, often taking an overnight period for them to recover. This paralyzing effect may be one of the main reasons the combination of smoking and asbestos exposure is so hazardous.

Down past the bronchi are the alveoli. These air sacs are intimately surrounded by a vast network of blood capillaries through which gas exchange occurs (oxygen in and carbon dioxide out). Oxygenated blood is then delivered to the heart where it is pumped to millions of tissue cells throughout the body.

Thus the heart and lungs are highly dependent upon each other in the process of getting oxygen into the body. When the lungs become restricted, damaged or ineffective, the heart must work harder. Bad cases of asbestosis often result in death by heart attack. Also, the wearing of respirators can be too much of a strain for some people (a few), and thus it is necessary to check this possibility before assigning or wearing a respirator.

The body's need for oxygen varies, so the breathing rate varies as does the heart rate. Respiratory rates tend to fall into ranges according to the level of activity:

Resting:	5-7 liters per minute (5,000-7,000 *cc per minute)

Working
Moderately: 25-30 liters per minute

(25,000 - 30,000 *cc per minute)

Exercising
Strenuously: 100-150 liters per minute

(100,000-150,000 *cc per minute)

*Cubic centimeters (same cc as when referring to fibers per cc).

These breathing rates are useful in determining how many fibers (asbestos) workers breath in during different periods and exposure conditions. For example, a worker (without a respirator) breathing at a rate of 25,000 cubic centimeters (cc) per minute, in an area for 480 minutes (8 hours) where the fiber levels are two fibers per cubic centimeter (2 f/cc), would breath in 24 million fibers. Calculated as follows:

25,000 cc/min x 480 min x 2 f/cc = 24,000,000 fibers

The same calculation method can be used for other breathing rates, exposure periods, and fiber counts.

Respiratory hazards are generally divided into two categories -- toxic contaminants and oxygen

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deficiency. The potential for either or both must be considered when addressing respiratory protection.

Normal air contains about 21 percent (20.9%) oxygen. For breathing purposes, air should not contain less than 19.5 percent or more than 23.5 percent oxygen. Oxygen deficiency generates a variety of symptoms, ranging from increased breathing and pulse rate to unconsciousness and death.

Asbestos abatement projects generally do not pose oxygen deficiency hazards. However, since there are abatement projects and circumstances where it can be a problem, it must always be considered. For example, there could be an oxygen deficiency problem while working in steam tunnels, mechanical chases, or boilers. It is also a consideration during the use of Type C supplied-air respirators (discussed in the next section of the notebook). Failing to consider oxygen deficiency could result in a quick fatality on an asbestos abatement project.

Toxic contaminants are the more common category of respiratory hazards on asbestos abatement jobs. Those toxic contaminants are generally subdivided into two categories, particulates and gaseous materials (or a combination of the two). Asbestos fibers are an example of the particulate subcategory and carbon monoxide is an example of the gaseous subcategory. It is possible to have both these hazardous substances, plus others (such as encapsulant solvents) in a work area at the same time.

As mentioned earlier, the effects of these contaminants can develop quickly or slowly, and they can be mild or fatal. For example, mesothelioma (special cancer of lung or abdomen linings) may take 20 to 45 years to develop, but once it is detected, it causes death within a year. Severe exposure to carbon monoxide can cause death within a few minutes, or may leave no residual damage if promptly detected and treated.

Acceptable limits of exposure for respiratory hazards are based on values documented through research by such organizations as the American Conference of Governmental Industrial Hygienists (ACGIH), the National Institute for Occupational Health and Safety (NIOSH), the Occupational Safety and Health Administration (OSHA), and others. These organizations publish Permissible Exposure Limits (PELs) and Threshold Limit Values (TLVs^{TM}) for a variety of toxic substances.

The limits are expressed for exposure durations, usually a full work shift. For example, the current OSHA limits for exposure to carbon monoxide are 50 parts per million (PPM) in workplace air and 20 PPM in air supplied to Type C respirators. The current limits and recommended guidelines for asbestos exposure range from 2 f/cc (OSHA) down to 0.01 f/cc or lower (generally accepted "clearance level" in abatement industry).

The control of respiratory hazards often involves three steps:

- assessing the hazards
- reducing or eliminating the hazards
- providing respiratory protective equipment

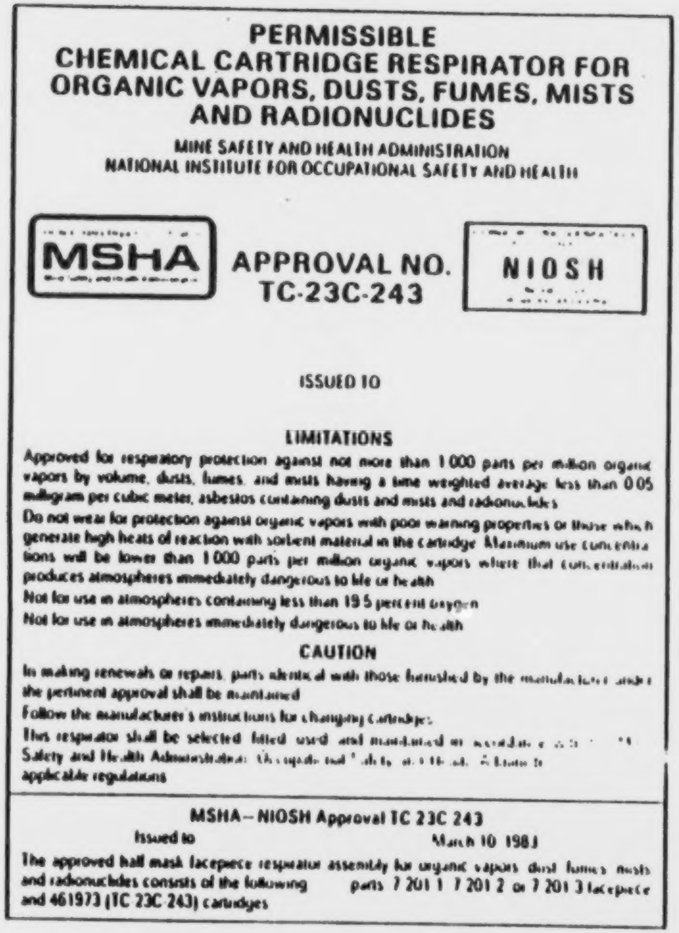
The asbestos abatement industry is actually based on these first two steps. Buildings and structures are surveyed to assess potential asbestos hazards. When a potential asbestos hazard exists, a group or contractor is called upon to reduce or eliminate the hazard through removal, encapsulation, or enclosure. Thus the third step, respirators, are generally avoided for the building occupants.

However, the removal, encapsulation, and enclosure work has a high potential for respiratory hazards. Thus, the steps of assessing hazards, reducing hazards, and providing respiratory protection must be used again.

Hazard assessment during the abatement work involves a variety of visual inspections. For example, barriers are checked for confinement, asbestos materials are checked for wetness, and surfaces are inspected for asbestos contamination. And, quite importantly, a variety of air samples are collected for asbestos fibers. Sampling locations include outside the barrier, in the work area, and on the workers. The results of the samples from the work area and workers are used to assure proper hazard reduction/elimination techniques, and more importantly, to choose proper respirators for the workers.

Several hazard reduction techniques are used inside the abatement area, including wetting with amended water, using negative air machines, prompt bagging of removal materials, wet cleaning and HEPA vacuuming. These techniques do reduce the air-borne fiber concentrations during removal projects, but they cannot get them down to the 0.01 f/cc level which is generally desired and specified. Thus, the employer (contractor) must proceed to the third hazard control step and provide proper respirators and an adequate respirator program for the workers. The respirators must be selected and the program established based on OSHA standards, the actual or anticipated air sampling results, and other guidelines (i.e., respirator manufacturers').

As required by the OSHA respirator standard (29 CFR 1910.134), only approved respirators should be considered during the selection process. And, the respirators must be approved for protection against the specific hazard -- asbestos, for example. The National Institute for Occupational Safety and Health (NIOSH) is the testing agency to see if a respirator model can receive approval. If the entire respirator assembly, including cartridges/filters/hoses, passes their test, then they and the Mine Safety and Health Administration (MSHA) issue a joint NIOSH/MSHA approval number for that specific respirator assembly. Here are two examples of approval labels printed on the literature for two respirators.



PERMISSIBLE
CHEMICAL CARTRIDGE RESPIRATOR FOR ORGANIC VAPORS, DUSTS, FUMES, MISTS AND RADIONUCLIDES

MINE SAFETY AND HEALTH ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

MSHA

APPROVAL NO.
TC-23C-243

NIOSH

ISSUED TO

LIMITATIONS

Approved for respiratory protection against not more than 1000 parts per million organic vapors by volume, dusts, fumes, and mists having a time weighted average less than 0.05 milligram per cubic meter, asbestos containing dusts and mists and radionuclides

Do not wear for protection against organic vapors with poor warning properties or those which generate high heats of reaction with sorbent material in the cartridge. Maximum use concentrations will be lower than 1000 parts per million organic vapors where that concentration produces atmospheres immediately dangerous to life or health

Not for use in atmospheres containing less than 19.5 percent oxygen

Not for use in atmospheres immediately dangerous to life or health

CAUTION

In making renewals or repairs, parts identical with those furnished by the manufacturer under the pertinent approval shall be maintained

Follow the manufacturer's instructions for changing cartridges

This respirator shall be selected, fitted, used, and maintained in accordance with the [illegible] Safety and Health Administration, Occupational Safety and Health Administration, [illegible] applicable regulations

MSHA—NIOSH Approval TC 23C 243

Issued to March 10 1983

The approved half mask facepiece respirator assembly for organic vapors, dust, fumes, mists and radionuclides consists of the following parts: 7 201 1, 7 201 2 or 7 201 3 facepiece and 461973 (TC 23C 243) cartridges

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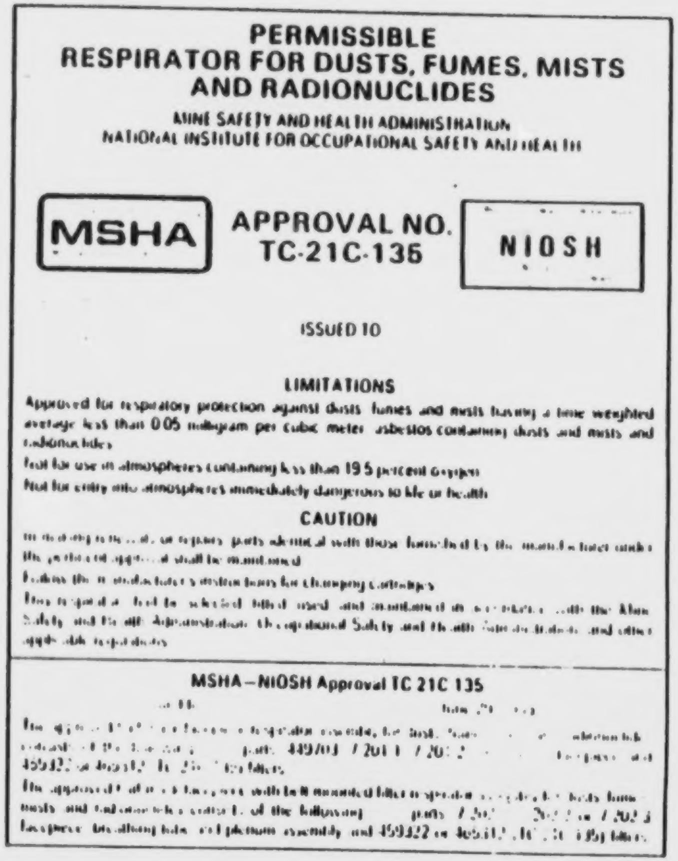


PERMISSIBLE
RESPIRATOR FOR DUSTS, FUMES, MISTS AND RADIONUCLIDES

MINE SAFETY AND HEALTH ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

MSHA

APPROVAL NO.
TC-21C-135

NIOSH

ISSUED TO

LIMITATIONS

Approved for respiratory protection against dusts, fumes and mists having a time weighted average less than 0.05 milligram per cubic meter, asbestos containing dusts and mists and radionuclides

Not for use in atmospheres containing less than 19.5 percent oxygen

Not for entry into atmospheres immediately dangerous to life or health

CAUTION

In making renewals or repairs, parts identical with those furnished by the manufacturer under the pertinent approval shall be maintained

Follow the manufacturer's instructions for changing cartridges

This respirator shall be selected, fitted, used and maintained in accordance with the Mine Safety and Health Administration, Occupational Safety and Health Administration and other applicable regulations

MSHA—NIOSH Approval TC 21C 135

[illegible] [illegible]

[illegible] parts 449703, 7 201 1, 7 201 2 [illegible] facepiece and 459322 or [illegible] filters.

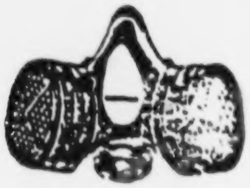
[illegible] parts 7 202 [illegible] 7 202 3 facepiece, breathing tube and plenum assembly and 459322 or [illegible] filters.

The first label is for a respirator model with high efficiency screw in cartridges, such as might be used for protection against airborne asbestos fibers. The approval number assigned by NIOSH for this specific manufacturer and model is TC-21C-135 (see label). The "TC" indicates "tested and certified"; the "-21C" indicates what style/category of respirator it is; and, the "-135" is a unique number assigned to this specific manufacturer and model.

The second label is for a chemical cartridge respirator such as might be used during encapsulating or spray painting. Note it has both a different style/category number, and its own assigned number. There are three major classes/categories of respirators, plus subcategories for each category. The major categories are:

- Air-Purifying
- Air-Supplied
- Self-Contained

AIR-PURIFYING RESPIRATOR

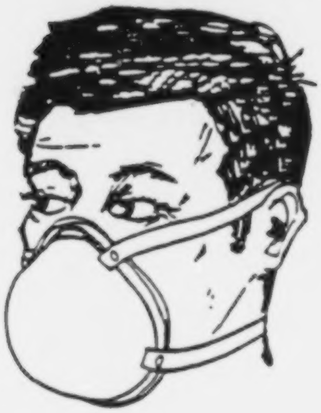


Air purifying respirators remove limited concentrations of air contaminants from the breathing air, but do nothing to improve (or change) the oxygen content. Thus, they can only be used in atmospheres where there is enough oxygen, and where air contaminants do not exceed the specified range of the respirator and cartridge.

These respirators generally consist of a soft, rubber facepiece and some kind of replaceable filter or cartridge. Two major subcategories of air purifying respirators are the mechanical filter type and the chemical cartridge type. The mechanical filter variety is designed to protect against particulate matter such as dust and asbestos fibers. The chemical cartridge variety is used to protect against light concentrations of chemicals, such as solvent vapors. There are even combination models approved for both types of protection. Respirator face pieces (including those for the air-purifying category) are used to further describe specific subcategories, based on the construction and face coverage. The major subcategories are:

- o Single-Use (Disposable)
- o Half Mask
- o Full Face

The following diagram shows a Single-Use (Disposable) type air-purifying respirator.

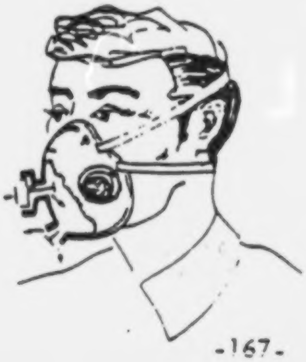


Single-Use Respirator

This type respirator is available in both approved and unapproved model. Some are even approved for asbestos. However, NIOSH has issued a notice stating that in spite of their required approval, they do not recommend them for protection against asbestos -- a proven human carcinogen. Thus, many industrial hygienists, safety professionals, manufacturers and trained individuals strongly recommend against this type respirator for protection against asbestos.

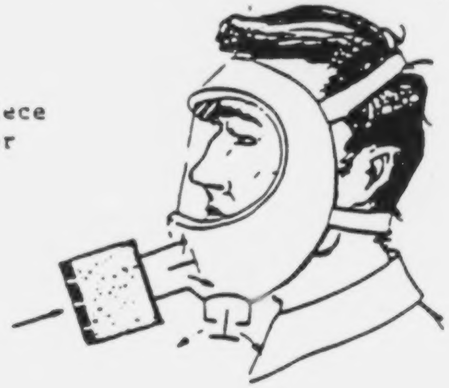
The next diagram shows a Half-Mask type air-purifying respirator. It also shows some of the common components.

Half-mask
Respirator



It is called a half-mask because it covers half of the face -- from under the chin to the bridge of the nose. Most, but not all, half-mask respirators are NIOSH/MSHA approved. It is still necessary to choose the correct approved model for the identified air contaminant. Note the respirator components and the correct position for the head and neck strap.

This diagram shows a Full-face type air-purifying respirator. It also shows some of its components.

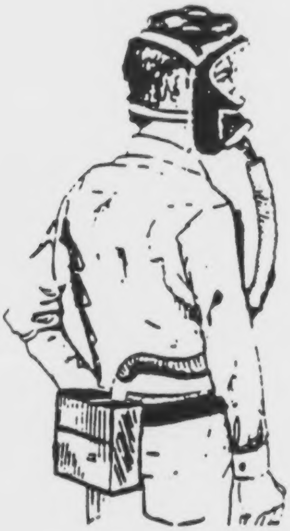


It is called a full-face type because it covers from under the chin up to the forehead. This broader coverage provides a better face fit, higher degree of protection, and gives some eye protection. Many full-face respirators have four or more straps. Regardless of the number of straps, the respirator should be put on by placing the chin into the chin cup, then tightening the straps going from the bottom to the top.

A relatively new (last 5-10 years) and special subcategory of air-purifying respirator is the Powered Air Purifying (PAPR) type. It has received considerable use on asbestos abatement proejcts, but now that use seems to be declining in favor of other types of respirators.

POWERED AIR PURIFYING RESPIRATOR

(PAPR)



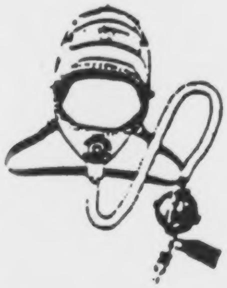
The previously described air-purifying respirators depend on breathing energy to draw the air in through the respirator cartridge or filter. However, these PAPR units use a battery-powered blower that passes the contaminated air through the cartridge or filter where the air is cleaned and forced through a hose to the facepiece. The face covering can be a half-mask, full-face mask, helmet (hat), or hood.

An advantage of using a powered air-purifying respirator is that is supplies air at a positive pressure within the facepiece, helmet, or hood, so that any leak is hopefully outward. Therefore, they provide a higher degree of protection than do half-mask and full-face air-purifying respirators.

Powered respirators must deliver at least four cubic feet of air per minute (4 CFM) to a tight-fitting facepiece and at least 7 CFM to a loose-fitting helmet or hood. They are reportedly designed to operate a full shift, but after repeated rugged use, some seem to need recharging or a new battery during the shift. This issue of operating duration has contributed to their declining use.

Air Purifying was the first listed category of respirator and Air-Supplied is the second category.

AIR-SUPPLIED RESPIRATOR



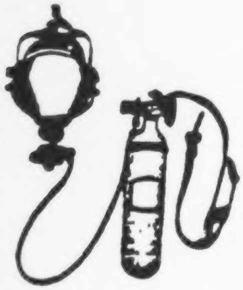
Air-supplied respirators deliver breathing air through a supply hose connected to the worker's facepiece (half mask or full face). This category of respirator is becoming the most important type on asbestos abatement jobs for several reasons:

- the OSHA asbestos standard (29 CFR 1910.1001) requires jobs be started with them
- they provide a very high degree of protection
- they are often required by the contract specifications.

Because of their importance and complexity, an entire section of this notebook is devoted to "Type C Air-Supplied" respirators. Thus, there is no need for further discussion in this section, other than to mention them as the second major category of respirators.

The third and last major category is the Self-Contained Respirator.

SELF-CONTAINED RESPIRATOR



Self-contained respirators provide protection for various periods of time depending upon the amount of breathing air (air pressure and tank size) and the breathing demands of the wearer. The worker is independent of his/her surrounding atmosphere when using these devices; therefore, they can be used in environments immediately harmful to life.

However, since they have several disadvantages, they are seldom used on asbestos abatement jobs, except by some inspectors. They are heavy and awkward to wear. The air supply usually lasts only 30 to 60 minutes, thus requiring a large supply of filled tanks onsite. They require more worker training than the other types of respirators.

However, none of the respirators are simple to select and use. They all require a detailed respirator program.

RESPIRATORY PROTECTION PROGRAM

Any employer who requires or permits employees to wear a respirator must have a written respiratory protection program. This is required by OSHA in their asbestos standard (29 CFR 1910.1001, copy attached as Appendix A of this manual) and respiratory protection regulations (29 CFR 1910.134, copy included in this section). The written respirator program establishes standard operating procedures for the asbestos abatement contractor concerning the use and maintenance of respiratory equipment. In addition to having such a written program, the contractor must also be able to demonstrate that the program is enforced and updated as necessary.

The OSHA regulations spell out just what must be included in a written program. Additionally, below, those items have been highlighted and discussed with special emphasis on applications to asbestos abatement work.

Designation of a Program Administrator

A program administrator must be designated by name. This person is responsible for implementation of and adherence to the provisions of the respiratory protection program. It is usually a good idea to also designate each person who is responsible for enforcement of the procedures at the job site. This is usually the site superintendent or foreman. Procedures should also be outlined for enforcement of the program.

Enforcement procedures and the development of the program as a whole should be done in conjunction with and input from the employees and/or their representative(s). Documentation should be maintained on any enforcement actions. This might include copies of written reprimands, evidence of docking a salary or dismissal for not complying with the program. Conversely, it is a wise idea to reward those employees who adhere to the program requirements.

SELECTION AND USE OF RESPIRATORY PROTECTION EQUIPMENT

Respirators used shall be selected from those approved by the Mine Safety and Health Administration (MSHA) or the National Institute for Occupational Safety and Health (NIOSH) for use in atmospheres containing asbestos fibers. A NIOSH approved respirator contains the following: an assigned identification number placed on each unit; a label identifying the type of hazard the respirator is designed to protect against; additional information on the label which indicates limitations and identifies the component parts approved for use with the basic unit.

Although some single-use disposable dust masks are "approved" by NIOSH for use with asbestos, they should not be used on asbestos abatement projects. NIOSH itself has stated clearly that they do not consider this form of respirator to be adequate protection.

As a rule of thumb, air-purifying respirators may be used during the prepping stage of an abatement project and during final clean-up (wiping down walls and floors after polyethylene is removed.) Supplied-air respirators are normally used during actual removal and gross clean-up. Air-purifying may be used for glovebag work and disposal at the landfill.

MEDICAL SURVEILLANCE

Only those individuals who are medically able to wear respiratory protective equipment shall be issued one. Before being issued a respirator, an employee will receive pertinent tests for medical and physical conditions. Medical tests to be considered by a physician include: pulmonary function tests (FVC and FEV), chest X-ray, electrocardiogram, and any others deemed appropriate by the examining physician. Medical factors to be considered by a physician include: emphysema, asthma, chronic bronchitis, heart disease, anemia, hemophilia, poor eyesight, poor hearing, hernia, lack of use of fingers or hands, epileptic seizures, and other factors which might inhibit the ability of an employee to wear respiratory equipment. Establishing a medical surveillance program is discussed in greater detail in Section VII of this manual.

FIT-TESTING

Any employee who is assigned a respirator must be given the opportunity to wear the respirator and be qualitatively fit-tested. The qualitative fit-test is used to determine the fit of the respirator to the face of the individual employee. A more detailed quantitative fit-test may be conducted instead. Methods of fit-testing are discussed elsewhere in this section.

RESPIRATOR ASSIGNMENT AND MAINTENANCE

Where practicable, respirators should be assigned to individual workers for their exclusive use. A system of recordkeeping should be established to document all employees who have respiratory protection equipment, and the periodic cleaning and maintenance of equipment.

Respirators shall be regularly cleaned and disinfected. Those issued for the exclusive use of one worker shall be cleaned after each day's use, or more often, if necessary. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use. This procedure is described as follows:

1. Before leaving the work area, each user must shower with the respirator on to remove any asbestos-containing material which may have settled on the equipment.

2. Respiratory equipment shall be washed with detergent in warm water using a brush. If possible, detergents containing a bactericide should be used. Organic solvents should not be used, as they deteriorate the rubber facepiece.

If bactericide detergent is not available, the detergent wash should be followed with a disinfecting rinse. Two types of disinfectants may be made from readily available household solutions. A hypochlorite solution (50 ppm) can be made by adding two tablespoons of chlorine bleach to one gallon of water. An aqueous solution of iodine (50 ppm) can be made by adding one teaspoon tincture of iodine to one gallon of water. A two minute immersion of the respirator into either solution would be sufficient for disinfection.

3. Respiratory equipment should be thoroughly rinsed in warm clean water (120°F maximum) to remove all traces of detergent, cleaner and sanitizer, and disinfectant.

4. Respiratory equipment should be allowed to air dry on a clean surface or hung from a horizontal wire.

When not in use, respiratory equipment should be sealed in plastic bags and stored in a single layer with the facepiece and exhalation valve in a non-distorted position. A metal cabinet with shelves is well suited for this purpose.

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Repair or replacement of component parts must be done by qualified individuals. Substitution of parts from a different brand or type of respirator will invalidate the approval of the respirator.

Inspection for defects in respiratory equipment must be done before and after each use and during cleaning. The primary defects to look for in the inspection of component parts of the respirator and corrective actions where appropriate are itemized below:

1. Air purifying respirators (quarter-mask, half-mask, and full facepiece)

    a. Rubber facepiece - check for:

        - excessive dirt (clean all dirt from facepiece)
        - cracks, tears, or holes (obtain new facepiece)
        - distortion (allow facepiece to "sit" free from any constraints and see if distortion disappears; if not, obtain new facepiece), and
        - cracked, scratched, or loose-fitting lenses (contact respirator manufacturer to see if replacement is possible; otherwise obtain new facepiece).

b. Headstraps - check for:

  - breaks or tears (replace headstraps)
  - loss of elasticity (replace headstraps)
  - broken or malfunctioning buckles or attachments (obtain new buckles), and
  - allow the facepiece to slip (replace headstrap)

c. Inhalation valve, exhalation valve - check for:

  - detergent residue, dust particles, or dirt on valve or valve seat (clean residue with soap and water)
  - cracks, tears, or distortion in the valve material or valve seat (contact manufacturer for instructions), and
  - missing or defective valve cover (obtain valve cover from manufacturer).

d. Filter element(s) - check for:

  - proper filter for the hazard

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- approval designation
- missing or worn gaskets (contact manufacturer for replacement)
- worn threads - both filter threads and facepiece threads (replace filter or facepiece, whichever is applicable)
- cracks or dents in filter housing (replace filter), and
- missing or loose hose clamps (obtain new clamps)

2. Atmosphere-Supplying Respirators

a. Check facepiece, headstraps, valves, and breathing tube, as for air-purifying respirators.

b. Hood, helmet, blouse, or full suit, if applicable - check for:

- headgear suspension (adjust properly for you)
- cracks or breaks in faceshield (replace faceshield), and
- protective screen to see that it is intact and fits correctly over the faceshield, abrasive blasting hoods, and blouses (obtain new screen)

c. Air supply system - check for:

- breathing air quality
- breaks or kinks in air supply hoses and end fitting attachments (replace hose and/or fitting)
- tightness of connections
- proper setting of regulators and valves (consult manufacturer's recommendations), and
- correct operation of air-purifying elements and carbon monoxide or high-temperature alarms

EMPLOYEE TRAINING PROGRAM

Each employee designated to wear a respirator must receive adequate training. The training session (initial and periodic retraining) should be conducted by a qualified individual to ensure that employees understand the limitations, use, and maintenance of respiratory equipment. Copies of the NIOSH Employer Respirator Manual and the NIOSH Employee Respirator Manual are included in Appendices C and D of this notebook for guidance.

SURVEILLANCE OF WORKING CONDITIONS

Personal air sampling, discussed in Section XIII, should be conducted during each asbestos abatement project. The employer must be able to document that the respiratory protection in use provides adequate protection for the employees in the airborne asbestos levels encountered.

Employees should receive instruction regarding emergency procedures. Normally, these instructions include immediately leaving the work area should they experience difficulty in breathing or dizziness. Finally, no employee wearing a respirator should ever work alone.

RESPIRATOR PROGRAM EVALUATION AND RECORDKEEPING

The respirator program shall be evaluated at least annually with program adjustments, as appropriate, made to reflect the evaluation results. Compliance to the aforementioned points of the program should be reviewed; respirator selection, purchase of approved equipment, medical screening of employees, fit testing, issuance of equipment and associated maintenance, storage, repair and inspection, appropriate surveillance of work area conditions.

Attention should be given to proper recordkeeping. Records which should be kept include: employees who are trained in respirator use, documentation of the care and maintenance of respirators, medical reports of each respirator user, airborne concentrations of asbestos fibers during work, and any problems encountered during abatement projects with regards to respiratory equipment.

RESPIRATORY FIT-TESTING

One of the most important elements of an effective respirator program is fit-testing. In fact, the OSHA respirator standard (29 CFR 1910.134) requires that the fit of respirators be determined when the respirators are issued and that the employees check the fit each time they put the respirator on. These are valid requirements since the weakest point of protection for a respirator is leakage around the face seal/fit.

There are two major categories of fit testing, qualitative (pass/fail basis) and quantitative (scientific measure basis). Then there are several

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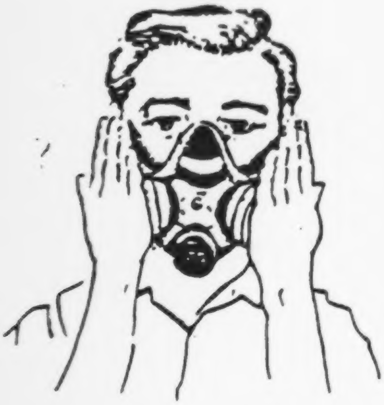
methods within both major categories. Only those considered most applicable to asbestos abatement will be presented in this section.

During any type fit-testing, the respirator straps must be properly located and as comfortable as possible. Over tightening the straps will sometimes reduce facepiece leakage, but the wearer may be unable to tolerate the respirator during the work period. The facepiece should not press into the face and shut off blood circulation or cause major discomfort. At the time of respirator issuance, a visual inspection of the fit should always be made by a second person. That person should check to see that there are not visible openings/leaks (around the nose, for example) and that the respirator appears properly adjusted and comfortable.

Qualitative (pass/fail) tests are fast, require no complicated, expensive equipment, and are easily performed. However, they depend on the wearer's response, and thus are not entirely reliable.

Negative Pressure Test. For this test, the user closes off the inlet of the cartridges or filters by covering with the palms or squeezing the breathing tube so it does not allow air to pass; inhales gently so the facepiece collapses slightly; and holds his/her breath for about 10 seconds.



NEGATIVE PRESSURE TEST

If the facepiece remains slightly collapsed and no inward leakage is detected, the respirator probably fits tightly enough. This test, of course, can only be used on respirators with tight-fitting facepieces. It also has potential drawbacks, such as the hand pressure modifying the facepiece seal and causing false results.

Positive Pressure Test. This test is very similar in principle to the negative pressure test. It is conducted by closing off/covering the exhalation valve and exhaling gently into the facepiece. The respirator fit is considered okay if slight positive pressure can be built up inside the facepiece without any evidence of outward leakage around the facepiece. For some respirators, this test requires that the

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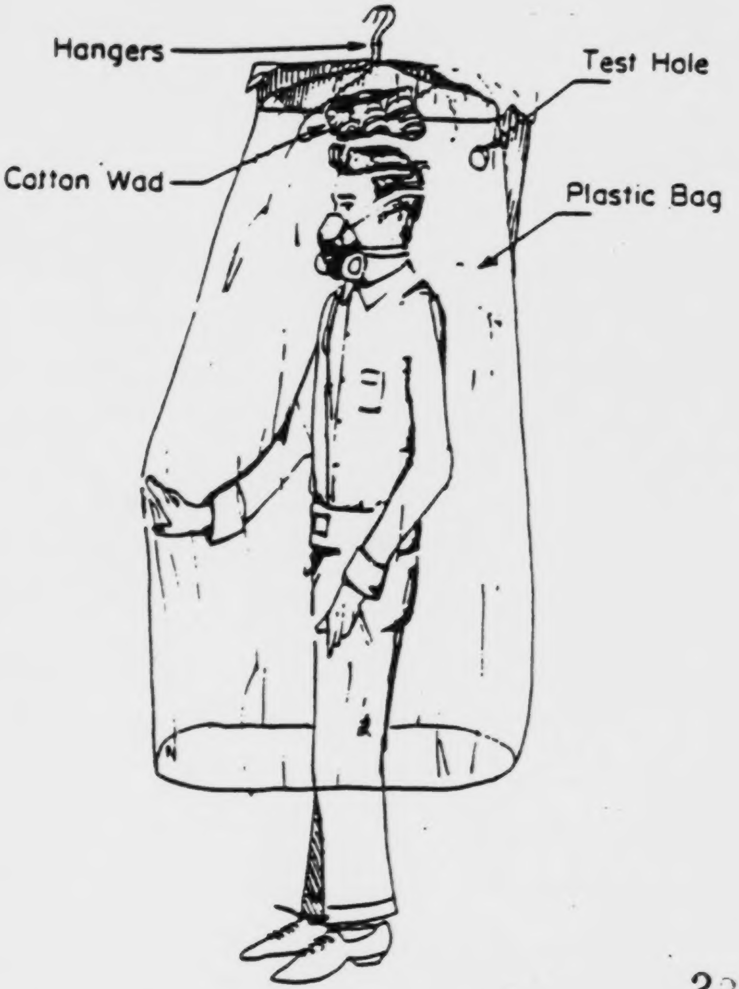
wearer remove the exhalation valve cover. This removal often disturbs the respirator fit if not done before the respirator is put on. The test is easy for respirators whose valve cover has a single small port that can be closed by the palm or a finger.

Irritant Smoke Test. Once the asbestos abatement worker has passed the visual, negative pressure, and positive pressure tests, they can be tested with irritant smoke. It can be used for both air-purifying and air-supplied respirators. However, an air-purifying respirator must have high-efficiency filters. The test substance is an irritant smoke (stannic chloride or titanium tetrachlorite). Sealed glass and plastic tubes with substances to generate this smoke are available from safety supply companies. When the tube ends a[illegible] broken and air passed through them with a squeeze bulb, a dense irritating smoke is emitted.

For this test, the user enters the test enclosures (often a clear, suspended plastic bag) and the irritant smoke is sprayed/squeezed into the test hole. If the wearer detects any irritant smoke inside the respirator, it means a defective fit, and adjustments or replacement of the respirator is required. This test has a distinct advantage in that the wearer usually reacts involuntarily to leakage by coughing or sneezing. The likelihood of merely pretending to pass the fit test is very low.

Note: The irritant smoke test must be performed with caution because the aerosol in highly irritating to the eyes, skin and mucous membranes. With half-mask facepieces, the eyes must be kept closed.

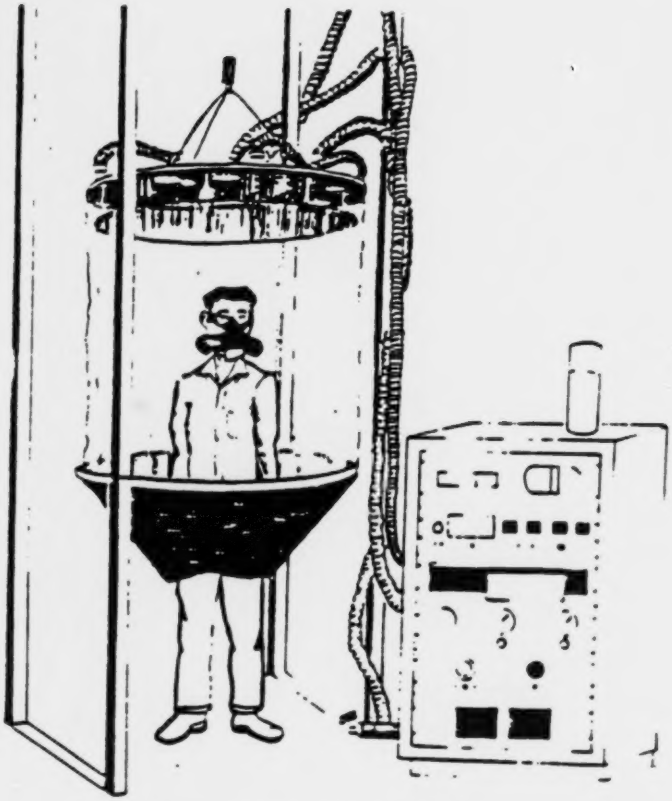
IRRITANT SMOKE TEST ENCLOSURE


Hangers
Test Hole
Cotton Wad
Plastic Bag

The negative pressure, positive pressure, and irritant smoke fit tests are all qualitative (pass/fail) type methods. They can and should be performed at the abatement job site.

There are more scientific methods of determining the fit of a respirator. Those methods are called quantitative fit tests. In fact, these quantitative fit tests are the methods used to determine a respirator's scientific and published degree of protection (protection factor).

Quantitative fit-testing requires a test substance which can be generated into the air, specialized equipment to measure the airborne concentration of the substances and a trained tester. A sodium chloride solution (salt/water) or mineral oil are usually the substances of choice. As shown in the diagram, the test subject wearing a respirator is placed into a chamber which contains the test substance in the air. The airborne concentration of the substance is measured outside the respirator and inside the respirator while the wearer performs several work-related activities. The specific degree of protection (protection factor) can be determined for that wearer/respirator combination by performing calculations with the measured concentrations.



QUANTITATIVE FIT TESTING

Quantitative fit testing is usually performed in a laboratory under research conditions. However, portable fit-testing units are now available and some organizations will come to the job site and perform quantitative fit tests on workers. Such testing will probably become even more common because of specification requirements, insurance demands, and potential lawsuits. These tests usually show that most workers receive much better protection than the standard protection factors published and quoted for respirators. Quantitative fit-testing usually costs $25-50 per worker, depending on several factors such as how many workers are to be tested at one site.

Regardless of the type fit test, its advantages and disadvantages, it is necessary to include such a test in an effective respirator program. It is the key to detecting and correcting contaminant leakage around the facepiece to face seal. This leakage can be critical when the contaminant is a proven human carcinogen -- asbestos.

A more extensive description of fit-testing methods is included in NIOSH's publication, "Respirator Protection ... An Employer's Manual." That entire publication is reproduced and included as Appendix C of this notebook.

PROTECTION FACTORS

Respirators offer varying degrees of protection against asbestos fibers. The key to understanding the differences between types of respirators (air-purifying, powered-air purifying, air-supplied, etc.) is the amount of protection afforded the wearer. To compare these, one must understand the concept of a protection facto PF).

A protection factor is a number obtained when the concentration of a contaminant outside the mask is divided by the concentration found inside the mask. This simple formula is illustrated below.

$$\text{Protection Factor (PF)} = \frac{\text{Conc. outside mask}}{\text{Conc. inside mask}}$$

The protection factor depends greatly on the fit of the mask to the wearer's face. Accordingly, the protection offered by any one respirator will be different for each individual person. Further, the protection constantly changes depending upon the worker's activities and even shaving habits. When a worker laughs or coughs inside a respirator, the protection factor will decrease since the mask will not "fit" as well during laughing or coughing. Similarly, a worker who forgot to shave one morning will not receive as much protection that day since the mask will not fit as well to the face. The importance of properly fitting the mask should now be obvious.

It is virtually impossible to measure the concentration inside the mask (where the worker is breathing) for each worker, all the time, during all the various activities he or she may be conducting. Accordingly, protection factors, based on extensive research, have been developed for different categories of respirators. Using these protection factors, it is easy to determine what type of respirator is appropriate to maintain the concentration of asbestos inside the mask below a certain level. If the assumption is made that 0.01 fibers per cubic centimeter (f/cc) is the re-occupancy concentration following an asbestos abatement project, then workers should never be exposed above this level inside the respirator.

Using established protection factors, the contractor may select from Table VIII-1 the appropriate respirator to maintain the concentration inside the respirator below 0.01 f/cc. It should be noted that the protection factors for powered-air purifying respirators are estimated on the most recent data available.

From this table, it should now be obvious why supplied-air respirators are recommended for actual removal and gross clean-up. Air-purifying respirators may be used for most projects during prepping and final clean-up (after the polyethylene is taken down). The importance of personal air sampling should also now be obvious. If personal air sampling has been conducted, and the employer wishes to keep the fiber concentration inside the mask below 0.01 f/cc, he/she may plug the numbers into the protection factor formula as illustrated below.

TABLE VIII-1.
SUGGESTED RESPIRATOR SELECTION FOR PROTECTION AGAINST ASBESTOS WHEN PROPERLY FITTED FOR USE AND PROPERLY MAINTAINED

Respirator Selection	PF	Maximum airborne fiber concentration outside the respirator to maintain exposure inside the respirator below 0.01 fibers/cc
High efficiency cartridge filter type (half mask)	10	0.1 fibers/cc
High efficiency cartridge filter type (full face mask)	50	0.5 fibers/cc
Powered-air purifying (PAPR) helmet type	(50-150)*	--
Powered-air purifying (PAPR) tight-fitting half mask	(100-200)*	--
Powered-air purifying (PAPR) tight-fitting full face mask	(200-300)*	--
Type C continuous-flow supplied air (half mask)	1,000	10 fibers/cc
Type C continuous-flow supplied air (full face or hood type)	2,000	20 fibers/cc
Pressure-demand self-contained breathing apparatus (SCBA)	10,000	100 fibers/cc

*Note: Studies are currently underway by NIOSH and others to estimate the protection factors for PAPRs. Values supplied are conservative estimates for properly operated units.

Example: Personal air sampling indicates the fiber concentration outside the mask is 3.5 f/cc (8-hour, time-weighted average). Then:

$$\text{Protection Factor Needed} = \frac{3.5 \text{ f/cc outside mask}}{0.1 \text{ f/cc desired inside mask}}$$

Protection Factor Needed = 350

By going to the table, any respirator with a protection factor above 350 (or 500 to leave a margin for error) should maintain the fiber concentration inside the mask below 0.10 f/cc.

Example: The employer may also use the protection factor formula to estimate concentrations inside the mask if the personal sampling results are available. If a worker's personal sample for an 8-hour workday was 2.7 fibers/cc and he wore an full-face supplied-air respirator, what is his estimated exposure inside the mask?

$$\text{Conc. in the mask} = \frac{\text{Conc. outside mask}}{\text{protection factor of mask}}$$

$$\text{Conc. in the mask} = \frac{2.7 \text{ f/cc (8-hour, TWA)}}{2000}$$

Conc. in the mask = 0.001 f/cc (8-hour, TWA)

Accordingly, if the worker wore the respirator properly fitted and maintained, his exposure should have been well below 0.01 f/cc (8-hour, TWA).

It should be noted that protection factors should only be used when the respirator is properly fitted, maintained, and used as intended. It should also be noted that protection factors for a specific model (and size) of respirator may be estimated for each employee if quantitative fit-testing is performed for each worker. This is discussed in the fit-testing part of this section.

PROTECTING THE WORKER: CLOTHING

It is first important to understand why protective clothing is worn during asbestos abatement work. The primary reason is to keep gross amounts of asbestos-containing debris off the body, hair, etc. The use of protective clothing and showers will minimize the chance of bringing asbestos out of the work area and into the home. Protective clothing will also minimize the chance of rashes and discomfort caused by the material being removed. In addition to the asbestos, frequently the material being removed contains mineral wool, fiberglass, and binders such as cement. Each of these may be

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irritating to the skin. Continued direct contact with asbestos has also been shown to cause "asbestos warts." These warts often take months to heal and occur more frequently if asbestos is trapped beneath a watchband, or in other ways kept in close contact with the skin.

Protective clothing for asbestos abatement projects usually consists of disposable coveralls, foot covering and head covering. The foot and head covering should be attached to the coveralls. This eliminates the need to tape openings between garments, etc. Tight fitting bathing suits are usually worn beneath the coveralls. Nylon suits work well and can be cleaned easily during showering. Gloves should be worn when inside the work area.

Protective clothing does not include street clothes (or shoes), T-shirts, blue jeans, sweat bands, kneepads, and socks. If any of these items are used inside the work area, they should remain there until the job is completed and disposed of as asbestos-contaminated waste. Jewelry such as rings and ID bracelets should not be worn in the work area.

Other protective clothing/items such as hard hats and safety shoes/boots should remain in the work area for the duration of the project. Upon project completion, these items can be cleaned, placed in a plastic bag, labeled as containing asbestos, and taken to the next project. If safety shoes/boots are not used, it is wise to have workers wear rubber soled, slip-on deck shoes. These remain in the work area and are disposed of at the end of the project as asbestos-containing waste. These deck shoes are usually of canvas construction and are inexpensive (about $10.00 per pair). It is a good idea to have each worker mark his shoes and hard hat with his/her name with permanent ink.

To summarize, listed below is a list of items normally worn by asbestos abatement employees.

- Disposable coveralls, disposable foot covering, disposable head covering
- Nylon swim suit
- Slip-on deck shoes with non-skid rubber soles
- Hard hat (as required)
- Gloves (cotton is practical)

- Eye protection (not needed if full facepiece respirators are used)

The disposable coveralls, foot, and head coverings are available from many sources and several materials. Coveralls, with foot and head covering attached usually cost about $3.00 each when purchased in quantity. Separately, the coveralls cost approximately $2.00, head covering about $0.35, and foot covering about $0.50 per pair. It is important to realize that many "bargain" prices may not be a bargain at all. The less expensive coveralls often use less material. Accordingly, coveralls marked "XL" may be too small for many workers. Be sure to check the construction of the coveralls as well. Double stitching on seams will last longer, but cost more.

A common problem on asbestos abatement projects is a failure by contractors to purchase enough coveralls for the project. Each worker must use a new coverall (and foot and head covering if not attached) each time he/she enters the work area. Assuming two breaks and a lunch period, four coveralls will be needed each day by each worker. Additional coveralls are usually needed for authorized visitors (architect, industrial hygienist, etc.) and to replace some that are torn to the point of being unusable. As a rule of thumb, the contractor may estimate the number of suits needed for a project by the following formula.

5 x no. of workers x project duration (days) x 1.1 =
number of coveralls needed

As an example, a project lasting 48 days using a crew of 8 workers and one job foreman will need the following number of coveralls (estimated).

5 x 9 workers & foreman x 48 days x 1.1 =
2376 coveralls

Accordingly, the contractor should order 95 cases (25 per case) of coveralls for the project. It should be noted that the "1.1" factor in the above formula provides a 10% surplus. This is often necessary for project overruns. Further, when purchasing coveralls, large and extra large sizes be bought. These can always be made to fit smaller employees.

PUTTING PROTECTIVE CLOTHING ON

Protective clothing is put on in the clean room of the decontamination unit before entering the work area. The following sequence should be used.

1. All street clothes, including undergarments are removed and stored in a clean, convenient location. Bins or lockers work well for this. It is usually wise to have a lockbox or other means to protect valuables. This will discourage employees from bringing wallets, rings, keys, etc. into the work area.

2. The nylon swim suit is put on.

3. The disposable coveralls are put on.

4. If separate disposable foot coverings are used, these are put on.

5. Ankles are taped to take up slack in the suits and reduce the chance of tripping. (Tape pants over foot coverings, if separate.)

6. The respiratory equipment is inspected, put on, and the fit checked.

7. The hood or head covering is put on over the respirator head straps.

8. Worker passes through airlocks and shower to contaminated equipment room.

9. Deck shoes are put on (or safety shoes/boots, as required).

10. Gloves are put on (cotton gloves are usually worn although leather gloves should be used for handling metal lathe). The sleeves are taped over the gloves using duct tape.

11. Other protective equipment such as hard hats and safety glasses (if a half-face respirator is used) are put on.

One person should remain outside the work area at all times. It should be his/her responsibility to ensure that each person entering the work area has the proper protective clothing.

Once inside the work area, no employees, or others, should be permitted to leave without going through the decontamination sequence unless it is an extreme emergency. A common problem is employees "stepping out" for a cigareete or supervisors "stepping in" the work area to deliver a message or piece of equipment. These activities defeat the purpose of the protective equipment and the decontamination sequence.

TAKING PROTECTIVE CLOTHING OFF

Whenever an employee or other person leaves a work area for any reason, he/she must go through the decontamination sequence. This sequence should include the following steps.

1. Remove all protective garments and equipment (except respirators) in an area immediately outside the shower on the contaminated side. An area should be designated for this purpose and kept as free as practicable of asbestos-contaminated material. All disposable clothing should be placed in plastic bags inside a drum and labeled as asbestos-containing waste.

2. The person should then clean reusable protective equipment such as boots/shoes, safety glasses, hard hats, etc.

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3. The person should then proceed to the shower still wearing his/her respirator. While showering, the person should be sure to soak the respirator cartridges if they are not using supplied air. The cartridges may then be discarded in a plastic bag located at the shower.

4. The person should then proceed to the clean room, dry off, dress in his/her street clothes, and disinfect, clean, and inspect his/her respirator. If air supply is not being used, new cartridges should be placed in the respirator.

Section 6: State of the Art Work Practices

Section objectives: information in this section will allow the participants to:

1. Understand the the basic components and requirements of an operation and maintenance program for asbestos control.
2. Describe routine methods of handling asbestos-containing materials and prohibited maintenance activities when asbestos-containing materials are involved.
3. Outline accepted procedures and list required equipment used for clean up of asbestos contaminated areas.
4. Understand the work practices and engineering controls for the small-scale, short-duration asbestos removal operation.
5. Understand the work practices and engineering controls for major asbestos removal, renovation, and demolition operations.
6. Describe the proper methods and procedures for the collection and disposal of asbestos contaminated waste.
7. Indentify the potential safety hazards associated with electricity, fire, ladders, scaffolds, walking, and working surfaces.

Section 6: State of the Art Work Practices

1. Purpose of the Operation and Maintenance Program

    Clean up asbestos fibers previously released

    Prevent future release of asbestos fibers

    Monitor the condition of ACM

2. Asbestos maintenance program

    Inventory of ACM

    Periodic examination

    Written procedures for handling asbestos
        Small-scale activities

        Asbestos disposal

        Asbestos-related emergencies

    Training for maintenance staff

3. Prohibited Maintenance Activities

- Do not drill holes in ACM
- Do not hang plants or pictures on ACM surfaced material
- Do not sand ACM floor tile
- Do not damage ACM while moving furniture and other materials
- Do not install curtains, etc. in a way that could damage ACM
- Do not dust floors, ceilings, moldings in asbestos-containing environments with a dry brush or broom
- Do not use an ordinary vacuum to clean up asbestos-containing debris
- Do not remove ceiling tiles below ACM without proper respiratory protection, isolation of the work area, and observing proper disposal procedures
- Do not remove ventilation system filters dry
- Do not shake ventilation system filters

4. Cleaning procedures for asbestos contaminated areas

Isolation of contaminated area

Wet methods

Amended water

HEPA vacuuming

5. Work practices for small-scale, short-duration operation

Definition of small-scale activities

Glove bag removal methods

Mini-enclosures

Removal of entire structures

Enclosure

6. Work practices for major asbestos removal, full-scale asbestos abatement

Definition of full-scale activities

Full-scale enclosures

Decontamination systems

Controlled ventilation

    Negative-air machines

Employee protection equipment

Air-monitoring

Sealant lock-down procedures

7. Disposal of asbestos-containing waste materials

Double-bagging

Special landfill procedures

8. Safety considerations other than asbestos

Potential electrical safety hazards

Potential fire hazards

Ladders and scaffolds

Walking and working surfaces

Section 7: Hands-On Activities

Employee Protection

Section objectives: information in this section will allow the participants to:

1. Gain experience with respirators, protective clothing, and other personal equipment associated with asbestos abatement projects.
2. Become familiar with the various types of respirators available for asbestos abatement.
3. Understand the functions of each component of a respirator and the proper maintenance and inspection procedures.
4. Describe the methods and procedures for respirator fit testing.
5. Fit test a personal respirator and certify the face seal.
6. Understand the proper methods of donning protective clothing and how to maximize the protection factor.
7. Practice donning and removal of full protective clothing.
8. Become familiar with other forms of personal protective equipment that may be utilized on an asbestos abatement job site.

NIOSH

Respiratory Protection…
A Guide for the Employee

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health

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I. RESPIRATORY PROTECTIVE EQUIPMENT SELECTION

The selection of the proper respiratory protective equipment involves, for the most part, three basic steps:

- Identification of the hazard;
- Evaluation of the hazard; and
- Selection of the proper respiratory protective equipment.

A. IDENTIFICATION OF THE HAZARD

Hazards may take many different forms. Since the selection of a respirator is based on the specific hazards to which you are exposed, JUST ANY RESPIRATOR WON'T DO. It is important to know something about the different kinds of hazardous materials which may exist within your facility requiring the use of respirators.

1. Gaseous Contaminants

Gaseous contaminants add another invisible material to the air we already breathe. There are two types of gaseous contaminants:

a. Gases include substances, e.g., carbon dioxide, which are solids or liquids only at very low temperatures and/or high pressures. Carbon dioxide is a gas at room temperature, but it also occurs as a solid, dry ice at low temperatures, and as a liquid in presurrized tanks.

b. Vapors are exactly like gases except that they are formed by evaporation of substances, such as acetone or trichloroethylene, which ordinarily exist as liquids.

2. Particulate Contaminants

Particulate contaminants are made of tiny particles or droplets of a material. There are three types of particulates:

a. Dusts are solid particles produced by such processes as grinding, crushing, and mixing of powder compounds. Examples are sand and plaster dust.

b. Mists are tiny liquid droplets given off whenever a liquid is sprayed, vigorously mixed, or otherwise agitated. Acid mists around diptanks used for metal cleaning and oil mists near newspaper printing presses are two examples.

c. Fumes are tiny metallic particles given off when metals are heated. Fumes are found in the air near soldering, welding, and brazing operations as well as near molten metal processes such as casting and galvanizing. The two basic forms — gaseous and particulates — frequently occur together. Paint spraying operations, for example, produce both paint mist (particulate) and solvent vapors (gaseous).

3. Oxygen Deficient Atmosphere

This condition is most commonly found in confined spaces with very poor ventilation. Examples are silos, petrochemical tanks, and the holds of ships. (In some situations an oxygen deficient atmosphere is purposely maintained. For instance, fruit is sometimes kept in warehouses with a lot of carbon dioxide and very little oxygen.) Oxygen deficient atmospheres occur in two different ways.

a. Oxygen is "used up" by a chemical reaction in which it is combined with other elements. This is what happens when fire burns or iron rusts.

b. Oxygen is "pushed out" by another gas. If a room with "normal" air (which contains about 21% oxygen) fills up with another gas, e.g., helium, there will be less oxygen in every breath you take because the oxygen is being steadily "displaced" by the helium.

Oxygen deficient atmospheres have been classified as immediately dangerous to life. Typical early symptoms are dizziness and euphoria — like being slightly drunk. Lack of oxygen affects the brain very quickly, so you might not be aware of what is wrong until you are too confused to escape. Oxygen starvation can cause serious injury to the brain.

4. Atmospheres Immediately Dangerous to Life or Health

This is a term which is used to describe very hazardous atmospheres in which exposure will:

a. Cause serious injury or death within a matter of minutes. Examples are exposure to high concentrations of carbon monoxide or hydrogen sulfide.

b. Cause serious delayed effects. Exposure to critical levels of radioactive materials or cancer-causing agents are examples.

B. EVALUATION OF THE HAZARD

Once a potential hazard has been recognized and the hazardous substance or particulate identified, it is then necessary to determine the amount of contaminant (concentration) present. The measured concentration can be stated in various "units," depending on the form of the contaminant. The two most widely used units are (1) mg/M^3 — milligrams of contaminant in air per cubic meter of air and (2) ppm — parts of contaminant in air per million parts of air. The measured concentration (in appropriate units) is then compared with either the permissible exposure level (PEL), mandated in OSHA regulations, or the threshold limit value (TLV), recommended by the American Conference of Governmental Industrial Hygienists (ACGIH). These values, as determined by these groups, are the maximum concentration to which a worker may be exposed day after day without adverse affects. It is your employer's responsibility to determine the concentration of the contaminant you are exposed to.

C. SELECTION OF THE RESPIRATORY PROTECTIVE EQUIPMENT

After the hazard(s) has been recognized and measured, the other factors still need to be considered.

- Is the contaminant recognized the *only* contaminant present?
- Does the contaminant have adequate warning properties? (Warning properties are especially important when *air-purifying* respirators are used against gases and vapors.)
- Will the contaminant irritate the eyes at the estimated concentration to which the user will be subjected?
- Can the contaminant be absorbed through the skin? If it can, will it result in a serious injury?

Now the proper respirator can be chosen.

What types are available?

1. Respirator types:

Respiratory protective devices can be divided into two general categories:

a. Air-purifying respirators
These devices remove the contaminant from the breathing air before it is inhaled. For each model of air-purifying respirator, there are usually many air-purifying filters available for protection against specific contaminants. These filters fall into two subgroups: particulate removing filters and vapor and gas removing filters called cartridges or canisters. These are discussed in Appendices I and II. Combination filters for protection against both particulates and organic vapors are also available.

b. Atmosphere Supplying Respirators
These devices supply uncontaminated breathing air to the user from a source other than the surrounding atmosphere. These types are usually complex and come in many configurations.

Atmosphere Supplying Respirators can be broken down into two subgroups.

Air Respirators, in which breathable air is conveyed to the user via a compressed air line or hose, and Self-contained Breathing Apparatus (SCBA), in which the user carries the breathing air sources which can be a compressed air tank or an oxygen generating device. See Appendices III and IV.

2. *Selection Procedures*

Selecting the proper respirator must be based on the hazard present, its concentration, and the form of the hazard (vapor, particulate, etc.).

3. *Approved Respiratory Protective Equipment*

OSHA requires that *approved* respirators be used if they are available. If only one brand of respirator on the market is approved for a particular hazard, then that brand is considered to be "available" and must be used.

An approved respirator is one that has been tested and found to meet minimum performance standards by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA). An approved respirator (by NIOSH) contains the following:

- An assigned identification number placed on each unit, e.g., TC-21C-101. The TC designation will always precede the identification number.
- A label identifying the type of hazard the respirator is approved to protect against.
- Additional information on the label which indicates limitations and identifies the component parts approved for use with the basic unit.

II. MEDICAL ASPECTS OF RESPIRATORY PROTECTIVE EQUIPMENT

The use of any type of respirator imposes some physiological stress on the user. *Air-purifying respirators*, for example, make breathing more difficult because the filter or cartridge can reduce the flow of air. The special exhalation valve on an *open circuit pressure demand* SCAB requires you to exhale against resistance. The bulk and weight of an SCBA can be a burden. If you are using an *airline respirator*, you might have to drag up to 300 feet of hose around. All of these factors can increase the "total" workload. If you have lung or heart problems, wearing a respirator could present an unacceptable risk. You should have some type of medical examination to determine if you are able to wear a respirator without it affecting your health.

A medical examination by a physician is the preferred screening mechanism. The following conditions may affect your ability to wear a respirator, and if they exist, you should get a medical opinion.

- Lung
  1. Do you have a history of asthma or emphysema?
  2. Do you have difficulty in breathing?
  3. Do you have any documented lung problems?
- Heart
  1. Do you have high blood pressure?
  2. Do you have artery diseases?
  3. Do you have documented heart problems?
- Other
  1. Do you have missing or arthritic fingers?
  2. Do you have facial scars?
  3. Do you have claustrophobia?

III. PROPER FITTING OF RESPIRATORY PROTECTIVE EQUIPMENT

Once a respirator has been selected for the contaminant to which you are exposed, and is appropriate for the airborne concentration, you are fully protected, right? Wrong! A respirator won't protect you unless the air you breathe goes through the "business end" — the canister, filter, or air supply system. If the face seal isn't tight or the connections are lose you may think you're breathing through it, but you will actually be breathing *around* it.

You may have to try on several different respirators before you find the one that fits properly. Your employer should have several types of respirators to choose from. Your employer must show you how to put the respirator on and how to adjust the straps for the best fit. The respirator should fit snugly, but it should not leave red marks, deep indentations on your face, or make it difficult to turn your head.

Beards and bushy sideburns may have to go, since respirator facepieces won't seal over them. Similarly, gum and tobacco chewing cannot be allowed since excess facial movement can break the faceseal.

If you wear prescription glasses, you must wear a respirator facepiece which will accommodate the glasses (this is especially critical, for full facepiece respirators). Contact lenses should not be worn while wearing a respirator. A properly fitted respirator — primarily a full facepiece respirator — will stretch the skin at the temples slightly so that the contact lens might pop out. Also, contaminants that do leak in around the sealing surface may get underneath the contact lens thus causing severe discomfort. Your first reaction would be to remove the facepiece to remedy the situation — which would be fatal in a lethal environment.

Two types of fitting tests are used to determine the proper fit of respiratory protective equipment: qualitative tests and quantitative tests. *Qualitative* tests are fast, usually simple, but not as accurate an indicator for improper fit as the quantitative test. The *quantitative* test, though more accurate, requires the purchase of expensive equipment, requires a specially trained operator, and is of limited use due to its complexity and bulk.

IV. MAINTENANCE OF RESPIRATORY PROTECTIVE EQUIPMENT

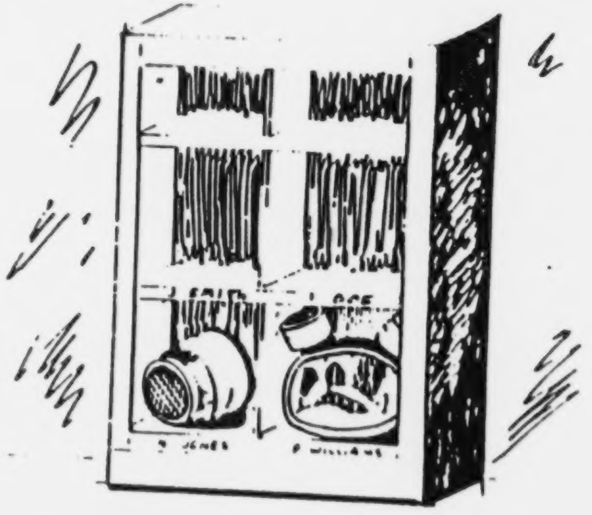
If you wear a respirator routinely it should be cleaned, inspected, and stored in a convenient location *after each use.*

A. CLEANING AND STORAGE

At the end of the workshift the respirator should be cleaned and stored in a convenient, clean location. If the respirator is shared, it should be cleaned *and* disinfected between users. In a large respirator program there may be a central facility for cleaning. In a small program, you may be expected to clean your own respirator. If so, the following method may be used.

- Wash with a detergent or a combination detergent and disinfectant, in warm water using a brush.
- Rinse in clean water, or rinse once with a disinfectant and once with clean water. (The clean water rinse is particularly important because traces of detergent or disinfectant *left* on the mask can cause skin irritation or dermatitis.).
- Dry on a rack or hang from a clothes line. In either case position the respirator so that the facepiece rubber won't "set" crooked as it dries.

Proper storage of a respirator is very important. The law requires that respirators be protected from dust, sunlight, heat, extreme cold, excessive moisture, and damaging or contaminating chemicals. A storage cabinet for air-purifying respiratory protective equipment is shown below.



B. INSPECTION

Inspection of the respirator is an important part of usage. You can further safeguard your health by performing (as appropriate) the below listed checks.

1. Disposable respirators, check for:

- Integrity of the filter (for holes);
- Straps for elasticity and deterioration,
- Metal nose clip for deterioration (if applicable).

2. Air-purifying respirators (quarter-mask, half-mask, full-facepiece, and gas mask):

a. Rubber Facepiece, check for:

- excessive dirt;
- cracks, tears, or holes;
- distortion from improper storage,
- cracked, scratched or loose fitting lens (full-facepiece),
- broken or missing mounting clips.

b. Headstraps, check for:
- breaks;
- loss of elasticity;
- broken or malfunctioning buckles or attachments;
- excessively worn serrations of the head harness which might allow the facepiece to slip (full-facepiece only).

c. Inhalation Valve, Exhalation Valve, check for:
- Detergent residue, dust particles, or dirt on valve or valve seat;
- Cracks, tears, or distortion in the valve material, or valve seat;
- Missing or defective valve cover.

d. Filter Element(s), check for:
- Proper filter for the hazard;
- Approval designation;
- Missing or worn gaskets;
- Worn threads — both filter threads and facepiece threads;
- Cracks or dents in filter housing;
- Deterioration of harness (gas mask canister);
- Service life indicator, or end of service date — for expiration (gas mask).

e. Corrugated Breathing Tube (gas masks), check for:
- Cracks;
- Missing or loose hose clamps;
- Broken or missing connectors.

3. *Atmosphere-Supplying Respirators*

a. Check facepiece, headstraps, valves, and breathing tube as discussed previously.

b. Hood, Helmet, Blouse, or Full Suit (if applicable), check for:
- Rips and torn seams;
- Headgear suspension;
- Cracks or breaks in faceshield;
- Protective screen to see that it is intact and fits correctly over the faceshield (abrasive blasting hoods and blouses).

c. Air Supply System, check for:
- Breaks or kinks in air supply hoses and end fitting attachments;
- Tightness of connections;
- Proper setting of regulators and valves (consult manufacturer recommendations);
- Correct operation of air purifying elements and carbon monoxide or high-temperature alarms.

d. Self-contained Breathing Apparatus (SCBA):
- Consult manufacturer's literature.

If defects are observed in a respirator, it must be removed from use until adequately repaired, or it must be replaced.

C. REPAIR

Sooner or later your respirator will need a new part or some other repair. The law requires that the people who repair respirators be well trained. And it is important for everyone to realize that respirator parts from different manufacturers are not interchangeable. The NIOSH approval will not hold if an air hose or a gasket or any other part has been replaced by one from a different brand of respirator. This is true even if the respirator seems to work just as well with the substitute part.

V. EMPLOYEE RESPONSIBILITIES

As a user of respiratory protective equipment, you also have responsibilities.

- Use respiratory protective equipment as instructed.
- Guard against damaging the respirator.
- Go immediately to an area of "clean" air if your respirator malfunctions.
- Report any malfunctioning of respiratory protective equipment to your supervisor. This would include but not be limited to:

— Discomfort;
— Resistance to breathing;
— Fatigue due to respirator usage;
— Interference with vision or communication;
— Restriction of movement.

It is impossible to cover briefly all the considerations that you should be familiar with because of the many types of respirators available. The manufacturer can supply much of the needed information. However, to be of value, it must be fully read and applied.

The appendices in this guide provide specific information on the general types of respirators most commonly in use. They are not all-inclusive, but do provide the basic information an employee should know about his particular respirator.

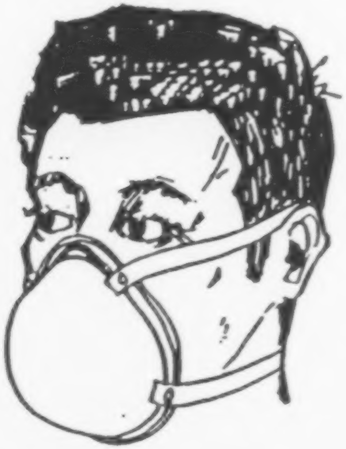
APPENDIX I

AIR-PURIFYING, PARTICULATE-REMOVING FILTER RESPIRATORS

A. DESCRIPTION

These are generally called "dust," "mist," or "fume" respirators, and by a "filtering" action remove particulates before they can be inhaled.

1. Single-use, dust



Side view showing
proper position of straps

The single-use respirator is a respirator which is completely disposed of after use. They are for individual use and should be discarded when resistance becomes excessive or the respirator is damaged. Generally, these respirators are approved only for pneumoconiosis- or fibrosis-producing dust such as coal dust, silica dust, and asbestos.

2. *Quarter-mask, dust and mist, and half-mask, dust and mist*

The quarter-mask covers the mouth and nose; the half-mask fits over the nose and *under the chin*. The half-mask usually produces a better facepiece-to-face seal than does the quarter-mask and is therefore preferred for use against more toxic dusts and mists.

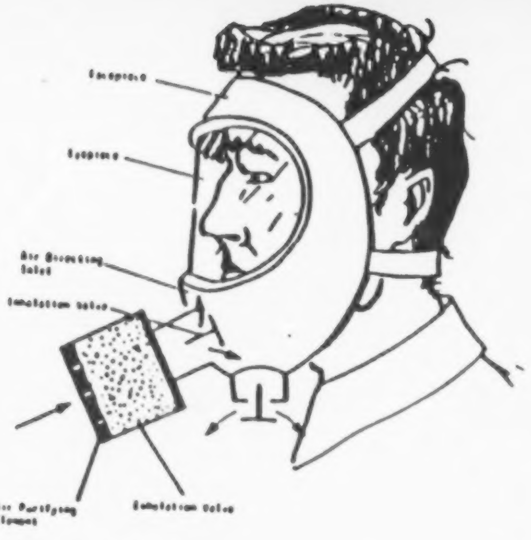
These dust and mist respirators are designed for protection against dusts and mists whose TLV is greater than .05 mg/M^3 or 2 mppcf.

3. *Half-mask, high efficiency*

This mask uses a high efficiency filter. Because of this high efficiency filter, this respirator can be used in atmospheres containing dusts, mists, fumes, or combinations of these forms where the TLV is *less* than .05 mg/M^3 or 2 mppcf.

4. *Full facepiece*

Full facepiece respirators cover the face from the hairline to below the chin. In addition to providing more protection to the face, the full facepiece gives a better seal than do the half- or quarter-masks. These respirators provide protection against dusts, mists, fumes, or any combination of these contaminants depending upon the type of filter used.



Typical full facepiece respirator.

B. LIMITATIONS

- Air-purifying respirators do *not* provide oxygen, so they must *never be worn in oxygen-deficient atmospheres.*
- Particulate-removing air-purifying respirators offer *no* protection against atmospheres containing contaminant gases or vapors
- These respirator types should not be used for abrasive blasting operations.

C. PROBLEMS

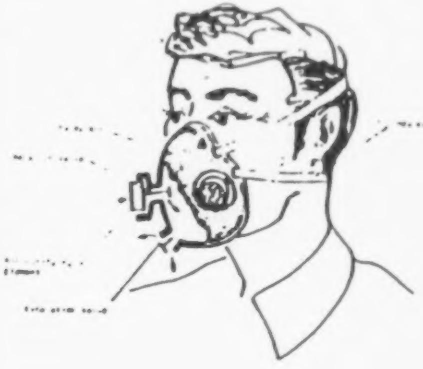
- The air flow resistance of a particulate-removing respirator filter element increases as the quantity of particles it retains increases, thus increasing the breathing resistance. *As a rule of thumb,* when comfortable breathing is impaired because of dust build-up, the filter should be replaced.
- Performance of some filter materials is affected by open storage in very humid atmospheres. Care should be taken in storing filter elements.

APPENDIX II

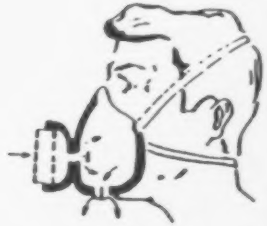
AIR-PURIFYING, CHEMICAL CARTRIDGE AND CANISTER RESPIRATORS FOR GASES AND VAPORS

A. DESCRIPTION

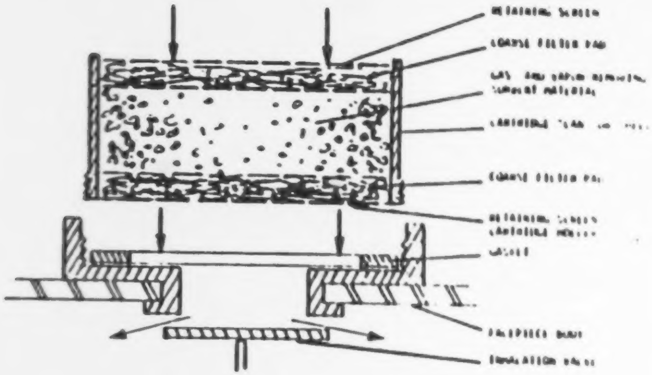
Vapor and gas-removing respirators use cartridges or canisters containing chemicals to trap or react with specific vapors and gases and remove them from the air breathed. The basic difference between a cartridge and a canister is the volume of the sorbent. Generally, a "cartridge" refers to a chemical filtering element which attaches directly to the facepiece, whereas a "canister" refers to the chemical filter element held in a harness and which is connected to the facepiece via a corrugated breathing tube. Some typical cartridge and canister respirators are shown below.



Typical half-mask respirator.



Typical quarter-mask respirator.



Typical chemical cartridge.

1. *Half-mask and Quarter-mask Chemical Cartridge or Canister Respirators*

These are available for protection against single chemicals such as ammonia or against entire classes such as organic vapors. Be sure to read the label on the cartridge or canister since it tells what the cartridge or canister protects against, the maximum concentration in which the element can be used, and in some instances, the service life or expiration date of the element.

2. *Full facepiece*

The full facepiece respirator may use a canister or cartridge(s) as the protective element. The front, back, and chin-mounted full-facepiece canister respirators are also referred to as "gas masks."

B. LIMITATIONS, CHEMICAL CARTRIDGE OR CANISTER

- These respirators do not supply oxygen, so they must *never be worn in oxygen deficient atmospheres.*

- They must not be used if the chemical to be protected against lacks adequate warning properties -- odor, taste, or irritation, unless their use is permitted by applicable OSHA or MHSA standards. Warnings such as these are necessary to alert you that the sorbent is saturated, and the contaminant is passing through the cartridge or canister, and you are breathing contaminated air

- They must not be used in atmospheres immediately dangerous to life or health, except for escape.

- They provide protection only from the specific gases or vapors they were designed to protect against (they may be worthless for other gases or vapors).

APPENDIX III

ATMOSPHERE SUPPLYING RESPIRATORS — SUPPLIED-AIR

Atmosphere-supplying respirators, rather than removing the hazardous material from the air, exclude the workplace air altogether and provide clean air from an independent source. There are two kinds of atmosphere supplying respirators: a *supplied air respirator* in which the user is supplied with respirable air through a hose, and a *self-contained respirator* in which the user carries a supply of respirable air.

A. DESCRIPTION — SUPPLIED-AIR RESPIRATOR

Supplied-air respirators use a central source of breathing air that is delivered to the wearer through an air supply line or hose. There are essentially two major groups of supplied-air respirators — the airline device and the hose mask with or without a blower.

1. *Airline Devices*

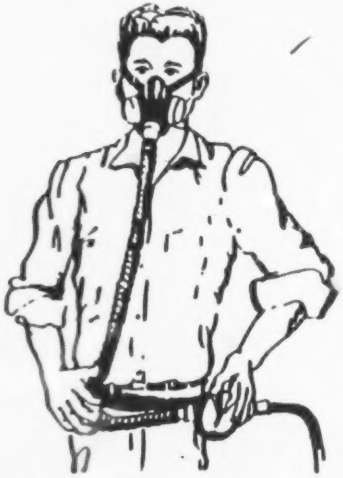
The distinction of airline devices is that they use a stationary source of compressed air delivered through a high-pressure hose. Airline devices can be equipped with half or full-face masks, helmets, or hoods, or the device can come as a complete suit. Airline respirators can be used for protection against either particulates, gases, or vapors. They provide a high degree of protection against these contaminants but they *cannot be used in at-*

mospheres immediately dangerous to life or health because the user is completely dependent on the integrity of the air supply hose and the air source. If something happens to either the hose or air supply, he may not be able to escape from the contaminated area fast enough without endangering his life.

A great advantage of the airline respirator is that it can be used for long continuous periods. There are three types of airline respirators.

a. Demand Airline Device

In a demand device, the air enters the facepiece only on "demand" of the wearer, i.e., when the person inhales. This is due to the nature of the valve and pressure regulator. An example of a demand, half-mask airline device is shown below.



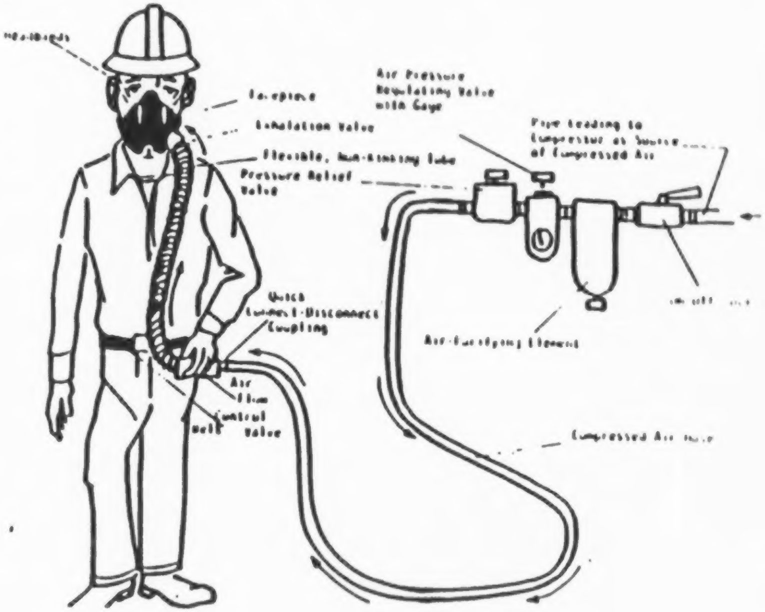
During inhalation there is a negative pressure in the mask, so if there is leakage, contaminated air may enter the mask and be breathed by the user. The leakage problem is a major drawback of the demand device. Demand devices are also available with a full-face mask, which provides a better seal than does the half-mask.

b. Pressure Demand Airline Devices

The pressure demand device has a regulator and valve design such that there is a continuous flow (until a fixed static pressure is attained) of air into the facepiece at all times, regardless of the "demand" of the user. The airflow into the mask creates a positive pressure outward. As such, there is no problem of contaminant leakage into the facepiece. This is a significant advantage of this type of device.

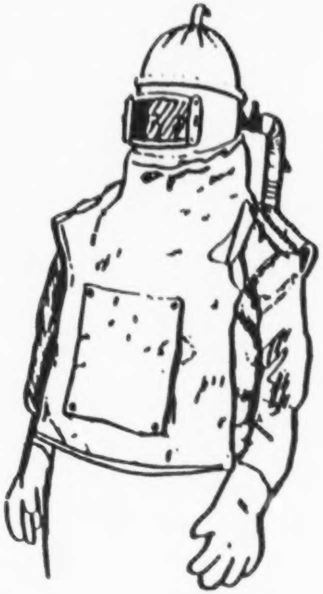
c. Continuous-flow Airline Device

The continuous-flow airline respirator maintains a constant airflow at all times and doesn't use a regulator, but uses an airflow control valve or orifice which regulates the flow of air. A continuous flow-full facepiece device is shown below.


Headbands
Facepiece
Exhalation Valve
Flexible, Non-kinking Tube
Pressure Relief Valve
Air Pressure Regulating Valve with Gage
Pipe Leading to Compressor at Source of Compressed Air
Air-Purifying Element
Quick Connect-Disconnect Coupling
Air Flow Control Valve
Belt
Compressed Air Hose

The continuous-flow device creates a "positive" pressure in the facepiece, and as a result, does not have the problem of inward leakage of contaminant.

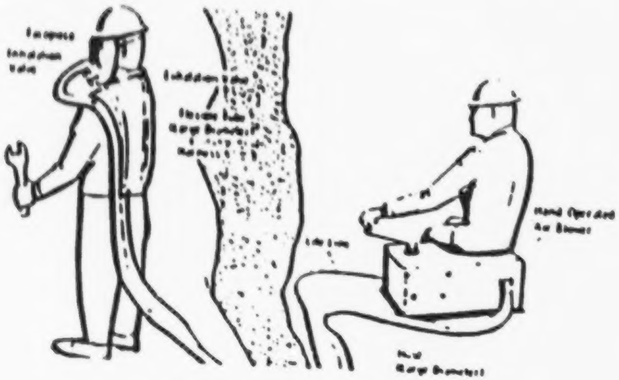
A special type of continuous-flow device that provides protection against flying particles of abrasive materials is also available. The abrasive blasting airline respirator, shown below, incorporates a loose fitting facepiece.



2. *Hose Masks*

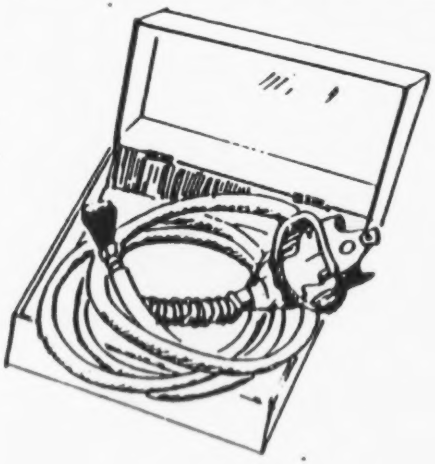
Hose masks supply air from an uncontaminated source through a strong, large diameter hose to the facepiece, and do *not* use compressed air or have any pressure regulating devices. (An advantage of the hose mask *with* a blower is its minimal resistance to breathing). Advantages of the hose mask *without* a blower are its theoretically long use periods and its simple construction, low bulk, easy maintenance, low initial cost, and minimal operating cost. Two types are available:

a. Those masks with hand or motor operated air blowers have a full facepiece mask. The hose length can be up to 300 feet. It must not be used in atmospheres immediately dangerous to life or health.



Hose mask respirator with hand operated blower.

b. Hose masks without blowers must have a tight fitting full facepiece. Helmets and hoods cannot be used. The hose mask without a blower can have up to 75 feet of hose.



Hose mask without Blower.

B. LIMITATIONS

1. *Airline Devices*

a. These devices must not be used in atmospheres immediately dangerous to life or health since the user is dependent upon an air hose which, if cut, crushed, or damaged, leaves him with little or no protection.

b. The trailing air supply hose of the airline respirator severely restricts the wearer's mobility. This may make the airline respirator unsuitable for those who must move frequently between widely separated work stations.

2. *Hose Mask*

a. The hose mask with a blower cannot be used in atmospheres immediately dangerous to life or health because the low air volume flow may result in a negative pressure being produced in the mask during inhalation allowing contaminated air to leak into the mask. Also, if the air hose is cut or obstructed, the user will be unprotected.

b. The trailing air supply hose of the hose mask severely limits mobility, so it may be unsuitable if frequent movement among separated work stations is required.

c. A severe restriction of the hose mask without a blower is that it is limited to a maximum hose length of 75 feet. Also, it requires the wearer to inhale against the resistance to air flow offered by the air hose which may become significant during heavy work. Inhaling against this resistance may cause fatigue.

APPENDIX IV

ATMOSPHERE SUPPLYING RESPIRATORS — SELF-CONTAINED BREATHING APPARATUS (SCBA)

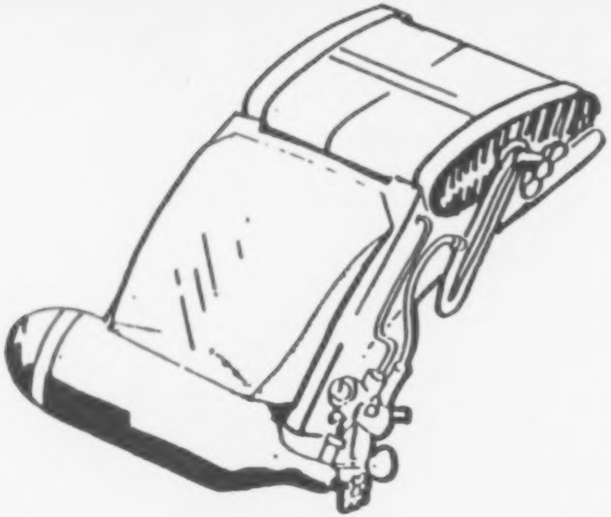
The self-contained breathing apparatus (SCBA) allows the user to carry a respirable breathing supply with him/her, and does not need a stationary air source such as a compressor to provide breathable air. The air supply may last from 3 minutes to 4 hours depending on the nature of the device.

A. DESCRIPTION — SCBA

1. *Closed Circuit SCBA*

Another name for closed circuit SCBA is "rebreathing" device. The air is rebreathed after the exhaled carbon dioxide has been removed and the oxygen content restored by a compressed oxygen source or an oxygen-generating solid. These devices are designed primarily for 1-4 hour use in toxic atmospheres. Because negative pressure is created in the facepiece during inhalation, there is increased leakage potential. Therefore, the devices should be used in atmospheres immediately hazardous to life and health only when their long-term use is necessary, as in mine rescue. Two types of closed circuit SCBA are available.

a. Compressed Oxygen Cylinder Type
In this device, breathable air is supplied from an inflatable bag. Exhaled air from the wearer is filtered to remove carbon dioxide and the oxygen consumed is replenished from an oxygen cylinder.



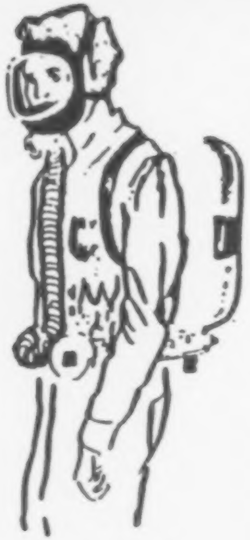
Typical oxygen-supplying closed circuit SCBA.

2. *Open Circuit SCBA*

An open circuit SCBA exhausts the exhaled air to the atmosphere instead of recirculating it. A tank of compressed air carried on the back, supplies air via a regulator to the facepiece. Because there is no recirculation of air, the service life of the open circuit SCBA is shorter than a closed circuit system. Two types of open circuit SCBA are available, "demand" or "pressure demand."

a. Demand SCBA

In a demand SCBA, air flows into the facepiece only on "demand of the wearer," i.e., when the person inhales. This is due to the nature of the valves and pressure regulator. An example of a demand open circuit is shown below. During inhalation there is a negative pressure in the mask, so if there is leakage, contaminated air can enter the mask and be breathed by the user. The leakage problem is a major drawback of the demand device. Because of this problem, a demand type open circuit SCBA should not be used in atmospheres immediately dangerous to life or health.



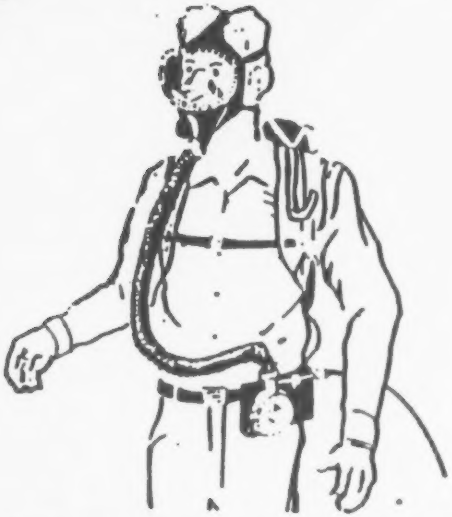
Typical open circuit SCBA.

b. Pressure Demand SCBA

The pressure demand open circuit SCBA has a regulator and valve design, which maintains a positive pressure in the facepiece at all times regardless of the "demand" of the user. As such, there is no problem of contaminant leakage into the facepiece. This is a significant advantage of the pressure demand device. A pressure demand SCBA is identical in appearance to a demand SCBA, but has a different regulator assembly and facepiece exhalation valve design.

3. *Combination Atmosphere Supplying Respirator: Supplied Air and SCBA*

Designed primarily as a long duration device, this respirator combines an airline respirator with an auxiliary air supply (usually compressed air) to protect against the possible failure of the primary air supply (the airline). The additional supply can be approved for 15 minutes or even longer. The choice depends upon how long it would take to escape from the toxic atmosphere if the primary air supply failed.



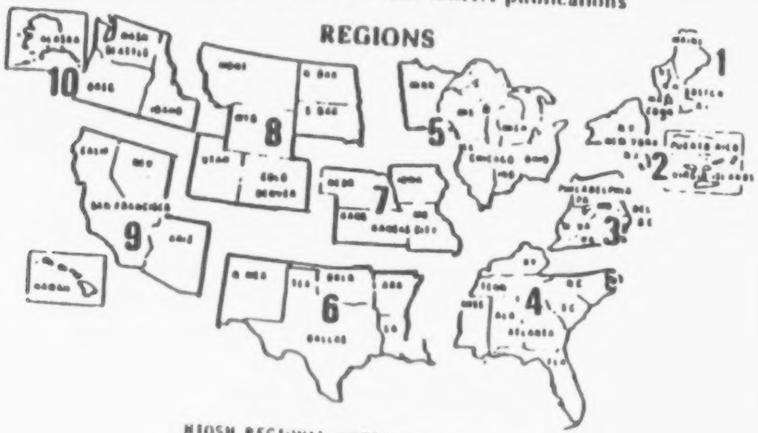
Typical combination air line and SCBA respirator.

B. LIMITATIONS

- The air supply is limited to the amount in the cylinder (SCBA's using a compressed air tank) and therefore the respirator cannot be used for extended periods without recharging or replacing the cylinders.
- Because these respirators are bulky and heavy, they are often unsuitable for strenuous work or use in confined spaces.
- Because of the *short* service time of the auxiliary air supply, the escape portion of the combination unit can be used only for escape from atmospheres Immediately Hazardous to Life or Health (IDLH) unless the escape portion has a minimum of 15 minutes service life. Such devices can then be used for entry into immediately dangerous to life or health atmospheres, provided not more than 20% of the available breathing supply is used. These devices may always be used for entry into IDLH atmosphere when utilized with the external air supply.

NIOSH AND OSHA REGIONAL OFFICES

The following pages list NIOSH and OSHA regional offices. Either of these facilities serving the state can provide information on the Occupational Safety and Health Act including questions on standards interpretations, voluntary compliance information, copies of the OSHA Standards, OSH Act Employee Rights Posting Notice, and other OSHA publications



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Room 1401
Boston, Massachusetts 02203
617/223-6668

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New York, New York 10007
212/264-2485

DHEW, Region III
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DHEW, Region IV
101 Marietta Tower
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404/221-2396

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DHEW, Region VII
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DHEW, Region VIII
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Denver, Colorado 80294
303/837-3979

DHEW, Region IX
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San Francisco, CA 94102
415/556-3781

DHEW, Region X
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206/442-0530

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Occupational Safety and Health Administration
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New York New York 10036 Telephone 212/971 5941/2

Region III
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Occupational Safety and Health Administration
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Philadelphia Pennsylvania 19104 Telephone 215/596 1201

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Section 8: Hands-On Activities

Glovebag Techniques

Section objectives: information in this section will allow the participants to:

1. Gain experience in the proper utilization of the glovebag technique for asbestos removal from pipes.
2. Understand the logic associated with glovebagging as a method of asbestos removal.
3. Outline the tools and equipment needed to perform an effective glovebag operation.
4. Compare advantages and disadvantages of the various types of glovebags currently available.
5. Outline the step by step procedure of an effective glovebag operation.
6. Perform a simulated asbestos pipe insulation removal using the glovebag method.
7. Perform proper clean-up and disposal of asbestos-containing waste generated by this technique.
8. Be aware of the precautions that need to be observed in order to perform the job safely.

OVERVIEW OF THE GLOVEBAG PROCEDURE

The glovebag consists of a 6-12 mil bag fitted with long sleeve gloves, a tool pouch and a two-inch opening used for water application. Although glovebags can be fabricated by the user for each project, most contractors prefer to purchase ready-made bags. The size, quality, style and cost vary depending on the manufacturer. The cost per glovebag is in a range of $10-40 apiece. In addition to the glovebag, several other tools and materials are commonly required to perform the project successfully. These materials, listed below, are readily available from most asbestos abatement contractor suppliers.

MATERIALS

1. Glovebag (one or more depending on project size)

2. Pump-up garden sprayer (2-3 gallon size)

3. Amended water (surfactant).

4. Duct tape (3-inch width)

5. Polyethylene disposal bags (6 mil)
6. Smoke tubes with aspirator bulb
7. HEPA-filtered vacuum cleaner
8. Bone saw
9. Utility knife with retractable blade
10. Wire cutters
11. Tin snips (if aluminum jacket is present)
12. Polyethylene plastic (roll of 4 or 6 mil)
13. Dual cartridge respirators with high efficiency cartridges
14. Disposable full-body suits with hood and feet covering
15. Small scrub brush
16. Stapler
17. Several rags

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18. Wettable cloth

19. Asbestos caution signs and labels

20. Reinsulation materials as necessary

BEFORE STARTING THE PROJECT

Two persons are required to perform the glovebag removal project. A third person is often available, however, to assist with supplies, keep unwanted visitors out of the area, and to conduct the air monitoring. Each of these team members should have received training on the use and limitations of glovebag removal projects. They should also be included in the respiratory protection program ar medical surveillance program.

Before any work begins, all necessary materials and supplies should be brought into the work area. This work area should be roped off and warning signs posted on the perimeter to minimize the chance of visitors entering this area. Barrier tape (3-inch) with a preprinted asbestos warning works well for this purpose. The HVAC serving the work area should be shut down, if possible. Employees should be trained in emergency procedures should the glovebag rupture. This usually includes wet cleaning and/or HEPA vacuuming procedures and a shower available at a remote location. With this phase completed, the following generic guidelines may be used for most pipe lagging projects REMEMBER! NEVER PERFORM GLOVEBAG REMOVAL ON HOT PIPES (OVER 150°F.) This may cause the bag or gloves to melt over the workers' hands and arms.

REMOVAL PROCEDURES

1. Following the manufacturer's directions, mix the surfactant with water in the garden sprayer.

2. Have each employee put on a cartridge respirator and check the face-fit.

3. Have each employee put on a disposable full-body suit. Remember, the hood goes over the respirator straps.

4. Check the pipe where the work will be performed. If it is damaged (broken lagging, hanging, etc.), wrap the entire length of the pipe in polyethylene plastic and "candystripe" it with duct tape. A common error when doing

glovebag work is forgetting that loose pipe lagging several feet or even several yards away from the glovebag work may be jarred loose by the activity. This is one of the common causes of high airborne fiber concentrations during glovebag work. The other problem is failure to clean up debris on the floor and other surfaces which has accumulated and contains asbestos. If the pipe is undamaged it is still necessary to place one layer of duct tape around the pipe at each location where the glovebag will be attached. This serves two purposes. First, it gives a good surface on which to seal the ends of the glovebag. Second, it minimizes the chance of releasing fibers when the tape at the ends of the glovebag is peeled off at the completion of the job.

5. Slit the top of the glovebag open (if necessary) and cut down the sides to accommodate the size of the pipe (about two inches longer than the pipe diameter). One brand has a zipper top and straps at each end facilitating installation of the bag on the pipe.

6. Place the necessary tools into the pouch located inside the glovebag. This will usually

include the bone saw, utility knife, rags, scrub brush, wire cutters, tin snips and wettable cloth. Note: It is easiest to pre-cut the wettable cloth at this point. Cut out a donut shape with the inner diameter 1/2-inch smaller than the diameter of the pipe beneath the insulation. The outer diameter of the donut should be three inches longer than the diameter of the pipe insulation being removed. Finally, cut a slit in each of the two donuts so they can be slipped around the pipe.

7. Place one strip of duct tape along the edge of the open top slit of the glovebag for reinforcement.

8. Place the glovebag around the section of pipe to be worked on and staple the top together through the reinforcing duct tape. Staple at intervals of approximately one inch. Next, fold the stapled top flap back and tape it down with a strip of duct tape. This should provide an adequate seal along the top. Next, duct tape the ends of the glovebag to the pipe itself, previously covered with plastic or duct tape (see step 4).

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9. Using the smoke tube and aspirator bulb, place the tube into the water sleeve (two-inch opening to glovebag). By squeezing the bulb, fill the bag with visible smoke. Remove the smoke tube and twist the water sleeve closed. While holding the water sleeve tightly, gently squeeze the glovebag and look for smoke leaking out, especially at the top and ends of the glovebag. If leaks are found, they should be taped closed using duct tape and the bag should be re-tested with smoke.

10. Insert the wand from the water sprayer through the water sleeve. Using duct tape, tape the water sleeve tightly around the wand to prevent air leakage.

11. One person places his hands into the long-sleeved gloves while the second person directs the water spray at the work.

12. If the section of pipe is covered with an aluminum jacket, this is removed first using the wire cutters to cut any bands and the tin snips to remove the aluminum. It is important to fold the sharp edges in to prevent cutting the bag when it is placed in the bottom. Use caution to prevent cuts - these edges are sharp!

13. With the insulation exposed, use the bone saw to cut the insulation at each end of the section to be removed inside the glovebag. Note: A bone saw is a serrated heavy-gauge wire with ring-type handles at each end. Throughout this process, water is sprayed on the cutting area to keep dust to a minimum.

14. Once the ends are cut, the section of insulation should be slit from end to end using the utility knife. The cut should be made along the bottom of the pipe and water continuously supplied. Again, care should be taken when using the knife not to puncture the bag. Some insulation may have wire to be clipped as well.

15. Spray all tools with water inside the bag and place back into pouch.

16. The insulation can now be lifted off the pipe and gently placed in the bottom of the bag.

17. Using the scrub brush, rags and water, scrub and wipe down the exposed pipe inside the glovebag. Note: The inexpensive horse rub-down mittens work well for this.

18. Wet the donut-shaped pieces of wettable cloth over the exposed ends of insulation remaining on the pipe. Wettable cloth is a plaster impregnated fiberglass webbing available at many hardware and/or plumbing supply stores.

19. Remove the water wand from the water sleeve and attach the small nozzle from the HEPA-filtered vacuum. Turn on the vacuum only briefly to collapse the bag.

20. Remove the vacuum nozzle and twist the water sleeve closed and seal with duct tape.

21. From outside the bag, pull the tool pouch away from the bag and twist it to separate it from the bag. Place duct tape over the twisted portion and then cut the tool bag from the glovebag, cutting through the twisted/taped section. In this manner, the contaminated tools may be placed directly into the next glovebag without cleaning. Alternatively, the tool pouch with the tools can be placed in a bucket of water, opened underwater, and the tools cleaned and dried without releasing asbestos into the air. Note: Rags and the scrub brush cannot be cleaned in this manner and should be

discarded with the asbestos waste. If more than one adjacent section of pipe is to be removed, the glovebag may be loosened at each end and slid along the pipe to the next section. In this case, the tools would remain in the bag for continued use.

22. With the removed insulation in the bottom of the bag, twist the bag several times and tape it to keep the material in the bottom during removal of the glovebag from the pipe.

23. Slip a 6 mil disposal bag over the glovebag (still attached to the pipe). Remove the tape and open the top of the glovebag and fold it down into the disposal bag.

24. Remove the disposable suits and place these into the bag with the waste.

25. Twist the top of the bag closed, fold this over, and seal with duct tape. Label the bag with a warning label.

26. Using a clean damp rag, wipe the exterior of the respirator and leave the work area. Remove the respirator.

27. Asbestos-containing material must be disposed of at an approved landfill in accordance with EPA regulations.

28. Air sampling should be conducted during and after completion of glovebag projects to determine if undetected leakage occurred. Sampling should be done by qualified persons with immediate analyses provided. Once the area has met the criteria for re-entry by unprotected personnel, the barriers may be removed and reinsulation completed. For further information concerning sampling procedures and clearance criteria, see the section entitled, "Air Sampling Requirements."

ASBESTOS CONTACT REPORT
GLOVE-BAG CONTAINMENT TECHNIQUE

____
Report Number

Respond to each item in order as work progresses. Explain any variations, unchecked items, or negative responses in "Remarks," item number 67. No asbestos contact is to be made without an Asbestos Contact Report.

☐ 1. Facility: ____________

☐ 2. Address: ____________

☐ 3. Owner: ____________

☐ 4. Date/Time: Start ____________ End ____________

☐ 5. Location of asbestos contact: ____________

____

☐ 6. Purpose of asbestos contact: ____________

____

☐ 7. Plan of operation: ____________

____

☐ 8. Emergency plan in case of spill: ____________

____

☐ 9. EPA, OSHA and other notifications filed by ____________
name date

☐ 10. Work authorized by ____________
signature date

Safety Gear, Equipment, Tools and Materials

☐ 11. Proper glove-bag enclosure
☐ 12. Protective clothing
☐ 13. Respirators
☐ 14. HEPA vacuum cleaner
☐ 15. Drop cloths
☐ 16. Spray bottles (2 or more)
☐ 17. Disposal bags
☐ 18. Ties to seal bags
☐ 19. Tools for use in bag:

a. ____________

b. ____________

c. ____________

☐ 20. Warning signs
☐ 21. Barrier Tape
☐ 22. Air monitoring pump
☐ 23. Air monitoring cassettes
☐ 24. Wet mop & buckets
☐ 25. Duct tape
☐ 26. Damp wiping cloths
☐ 27. Amended water
☐ 28. Materials for use in bag:

a. ____________

b. ____________

c. ____________

☐ 29. Other safety gear, equipment, tools, and materials required:
a. ____________ c. ____________ e. ____________
b. ____________ d. ____________ f. ____________

☐ 30. Safety gear, equipment, tools, and materials READY.

OPERATIONS

☐ 31. Occupants educated
☐ 32. Area vacated
☐ 33. "Before" air monitoring completed
☐ 34. Warning signs and barriers erected
☐ 35. Heating, ventilation, air conditioning shut off
☐ 36. Area isolated (doors, windows, etc. closed)
☐ 37. Glove-bag enclosure prepared for attachment
☐ 38. Tools and materials in glove-bag (items in 19 & 28)
☐ 39. Respirators and protective clothing on
☐ 40. Drop cloths in place
☐ 41. ACM (asbestos containing material) misted until wet.
☐ 42. Glove-bag enclosure attached and sealed
☐ 43. HEPA vacuum cleaner connected
☐ 44. Seal checked by operating HEPA Vacuum, adjusted as required
☐ 45. Hands inserted into gloves of enclosure
☐ 46. ACM, tools, and inside of bag misted
☐ 47. "During" air sampling in progress
☐ 48. Repair or removal of ACM started
☐ 49. Exposed ACM misted as required to keep wet
☐ 50. Wetted ACM placed in bottom of bag
☐ 51. Encapsulant applied to exposed ACM
☐ 52. Sharp tool edges covered; All tools and unused materials placed in bag bottom
☐ 53. Top or work area of bag cleaned and washed down
☐ 54. Hands removed from bag
☐ 55. Air exhausted from bag with HEPA vacuum
HEPA VAC
☐ 56. Portion of bag containing ACM waste and tools gathered and tied off
☐ 57. Asbestos disposal bag slipped around glove bag
☐ 58. Glove-bag enclosure removed and placed into disposal bag
☐ 59. Air exhausted from disposal bag and bag sealed
☐ 60. Area cleaned using HEPA vacuum and/or wet methods as appropriate
☐ 61. Contaminated drop cloths, protective clothing, respirator cartridges, and waste placed into disposal bag, wetted, air exhausted with HEPA vacuum and bag is sealed
☐ 62. All wastes double bagged, sealed, and disposed of properly
☐ 63. "After" air monitoring performed
☐ 64. Operations completed safely, legally, and according to good practice
☐ 65. Amount of ACM removed?____________________
☐ 66. Summary of air monitoring results (attach laboratory report)

Before ________ f/cc __________ f/cc __________ f/cc
During ________ f/cc __________ f/cc __________ f/cc
After ________ f/cc __________ f/cc __________ f/cc

☐ 67. Remarks: ____________________

☐ 68. Work performed and reported by: (All workers must sign)

Name CAW Number Date

Name CAW Number Date

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Section 9: Hands-On Activities

Mini-Enclosures

Section objectives: information in this section will allow the participants to:

1. Gain experience in the proper set-up of work area enclosures for localized removal of asbestos materials.
2. Understand the objectives of preparation of the work area.
3. Understand the objectives of and the procedures of the decontaimination section of the enclosure.
4. Outline the tools, equipment, and materials needed to seal off a work area.
5. Outline the step-by-step procedures for the construction of a mini-enclosure work area.
6. As a group, construct a mini-enclosure fo a simulated small-scale asbestos removal.
7. Perform proper clean-up and disposal of asbestos-containing waste generated by this technique.
8. Be aware of the precautions that need to be observed in order to perform the job safely.

PREPARING THE WORK AREA

Airborne fibers which are generated by disturbance of asbestos-containing material may remain suspended in the air for long periods of time because of their small size and aerodynamic properties. These airborne asbestos fibers can migrate via air currents to other parts of the building.

Proper preparation of the work area before an asbestos abatement project begins serves the primary purpose of containing fibers which are released within the work area. Good preparation techniques serve to protect interior finishes such as hardwood floors or carpets from water damage and reduce cleanup effort. General safety issues are also a major consideration in work area preparation (see section in Other Safety and Health Considerations).

Each project has unique requirements for effective preparation. For instance, the sequence of steps would probably be different for preparing a boiler room than preparing an area with asbestos material above a suspended ceiling. The following are general guidelines which can be modified to address specific problems encountered on an asbestos abatement project.

STEP 1 - Conduct Walkthrough Survey of the Work Area

The contractor, building owner, and architect should make a walkthrough survey to inventory and photograph any existing damages.

STEP 2 - Post Warning Signs

Warning signs should be placed at each entrance to the work area. Re-usable metal signs or disposable cardboard signs are available. Signs should inform the reader that breathing asbestos dust may cause serious bodily harm. See section (g) of the Occupational Safety and Health Administration asbestos standard for sign specification (Appendix). These signs are available from most safety supply houses and asbestos abatement contractor suppliers.

STEP 3 - Shut Down the Heating, Ventilating, and Air Conditioning System (HVAC)

The HVAC system supplying the work area should be shut down and isolated to prevent entrainment of asbestos dust throughout the building. To avoid inadvertent activation of the HVAC system while removal operations are in progress, the control

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panel should be tagged (advising personnel not to activate) and locked.

All vents and air ducts inside the work area should be covered and sealed with two layers of 6 mil polyethylene and duct tape. The first layer of polyethylene should be left in place until the area has passed final visual inspection and clearance air monitoring.

HVAC filters which may be contaminated with asbestos dust should be removed and disposed of in the same manner as the other asbestos-containing materials (see Disposal of Waste).

STEP 4 - Clean and Remove Furniture and Non-Stationary Items from the Work Area

Workers wearing half-mask high efficiency filter cartridge respirators and disposable clothing should remove all non-stationary items that can feasibly be taken out of the work area. This prevents further contamination of the items and facilitates the removal process. Before storing the items outside the work area, they should be cleaned with a high efficiency particulate air (HEPA) filtered vacuum and/or wet-wiped to remove any asbestos-containing dust. Drapes should be removed for dry cleaning or disposal. Carpet should be disposed of as asbestos-containing waste.

STEP 5 - Seal Stationary Items with Polyethylene

Items not being removed from the work area, such as large pieces of machinery, blackboards, pencil sharpeners, water fountains, toilets, etc., should be wet-wiped or HEPA vacuumed and wrapped in place with 6 mil polyethylene and sealed with duct tape.

Water fountains should be disconnected, covered with two layers of polyethylene, and labeled non-operational to discourage anyone from cutting through the polyethylene to get a drink.

Electrical outlets should be shut down, if possible, and sealed with tape or covered with polyethylene and then taped.

STEP 6 - Tape and Seal Windows with Polyethylene

The edges of all the windows should be sealed with 3" wide high quality duct tape. After the edges have been taped, the windows should be covered and sealed with 6 mil polyethylene and duct tape.

STEP 7 - Cover the Floor with Polyethylene

Six mil polyethylene sheets should be used to cover the floor in the work area. Several sheets may be seamed together with spray adhesive and duct tape. Blue or red carpenter's chalk placed beneath the seam line will darken in color if water leaks through. Any leaks which occur should be promptly cleaned up. The polyethylene floor sheets should be cut and peeled back to allow access to the wet area. After mopping up the water and any contamination that leaked through, the area should be wet-wiped with clean rags. The peeled-back sheets are put back in place and sealed with duct tape after the area drys. An additional "patch" sheet can be placed over this area and sealed with tape to provide extra protection.

After joining the sheets of polyethylene together, the floor covering should be cut to the proper dimensions, allowing the polyethylene to extend twenty-four inches up the wall all the way around the room. The polyethylene should be flush with the walls at each corner to prevent damage by foot traffic.

When the first layer of polyethylene has been secured in place, a second layer should be installed with the seams of the first and second layers offset. The second layer of polyethylene should extend a few inches above the first layer on the wall and secured with three-inch duct tape.

When covering stairs, ramps, or other potential slippery spots with polyethylene, care must be taken to provide traction for foot traffic. Wet polyethylene is very slippery and can create serious tripping hazards. To provide better footing, masking tape or thin wood strips can be placed on top of the polyethylene to provide rough surfaces in these areas.

STEP 8 - Cover the Walls with Polyethylene

After the floors and stationary objects have been covered with polyethylene, one or two layers of 4 mil polyethylene are used to cover the walls. The lighter weight 4 mil is easier to hang and keep in place than the heavier 6 mil.

The sheets of 4 mil polyethylene should be hung from the top of the wall a few inches below the asbestos material and should be long enough to overlap the floor sheets by twenty-four inches. The vertical sheets should be overlapped and seam-sealed with adhesive duct tape.

The sheets should be hung using a combination of nails and furring strips (small wood blocks), or adhesive and staples, and sealed with four-inch duct tape. Duct tape alone will not support the weight of the polyethylene after exposure to the high humidity which often occurs inside the work area. Nails may cause some minor damage to the interior finish; however, it is usually more time efficient to touch up the nail holes than to repeatedly repair fallen barriers.

STEP 9 - Locate and Secure the Electrical System to Prevent Shock Hazards

Amended water is typically used to saturate asbestos-containing sprayed-on material prior to removal. This creates a humid environment with damp to very wet floors. The electrical supply to the work area should be de-energized and locked out before removal operations begin to eliminate the potential for a shock hazard.

Before removal begins:

- Identify and de-energize electrical circuits in the work area.

- Lock the breaker box after the system has been shut down and place a warning tag on the box.

- Make provisions for supplying the work area with electricity from outside the work area which is equipped witn a ground-fault-interrupt system.

- If the electrical supply cannot be disconnected, energized parts must be insulated or guarded from employee contact and any other conductive object.

STEP 10 - Removing or Covering Light Fixtures

Light fixtures may have to be removed or detached and suspended (bailing wire works well) to gain access to asbestos-containing material. Before beginning this task, the electrical supply should be shut off. Light fixtures should be wet wiped before they are removed from the area. If it is not feasible to remove the light fixtures, they should be wet wiped, then draped with plastic or completely enclosed.

STEP 11 - Securing the Work Area

When the work area is occupied, padlocks must be removed to permit emergency escape routes. Arrows should be taped on the polyethylene-covered walls to indicate the location of exits. All entrances should be secured when removal operations are not in progress. Provisions must also be made to secure the decontamination station entrance when no one is on the job site. Security guards may be a reasonable precaution, depending on the nature of the project.

Nonessential personnel should not be permitted to enter the work area. An on-site job log should be maintained for recording who enters the work area and the time each person enters and exits the work zone.

ESTABLISHING A DECONTAMINATION UNIT

The decontamination station is designed to allow passage to and from the work area during removal operations with minimal leakage of asbestos-containing dust to the outside. A typical unit consists of a clean room, a shower room, and an equipment room separated by airlocks. The airlocks are formed by overlapping two sheets of polyethylene at the exit of one room, and two sheets at the entrance to the next room with three feet of space between the barriers (see Figure X-1). There are various methods for constructing airlocks including a hatch type construction and a slit and cover design.

Materials used to construct a typical unit include 2-inch by 4-inch lumber for the frame, 1/4 inch to 1/2 inch plywood or 6 mil polyethylene for the walls, duct tape, staples and nails. The floor should be covered with three layers of 6 mil polyethylene. The decontamination unit can be built in sections to allow for disassembly and re-use at another area of the building. The design of the decontamination station will vary with each project depending on the size of the crew and the physical constraints imposed by the facility.

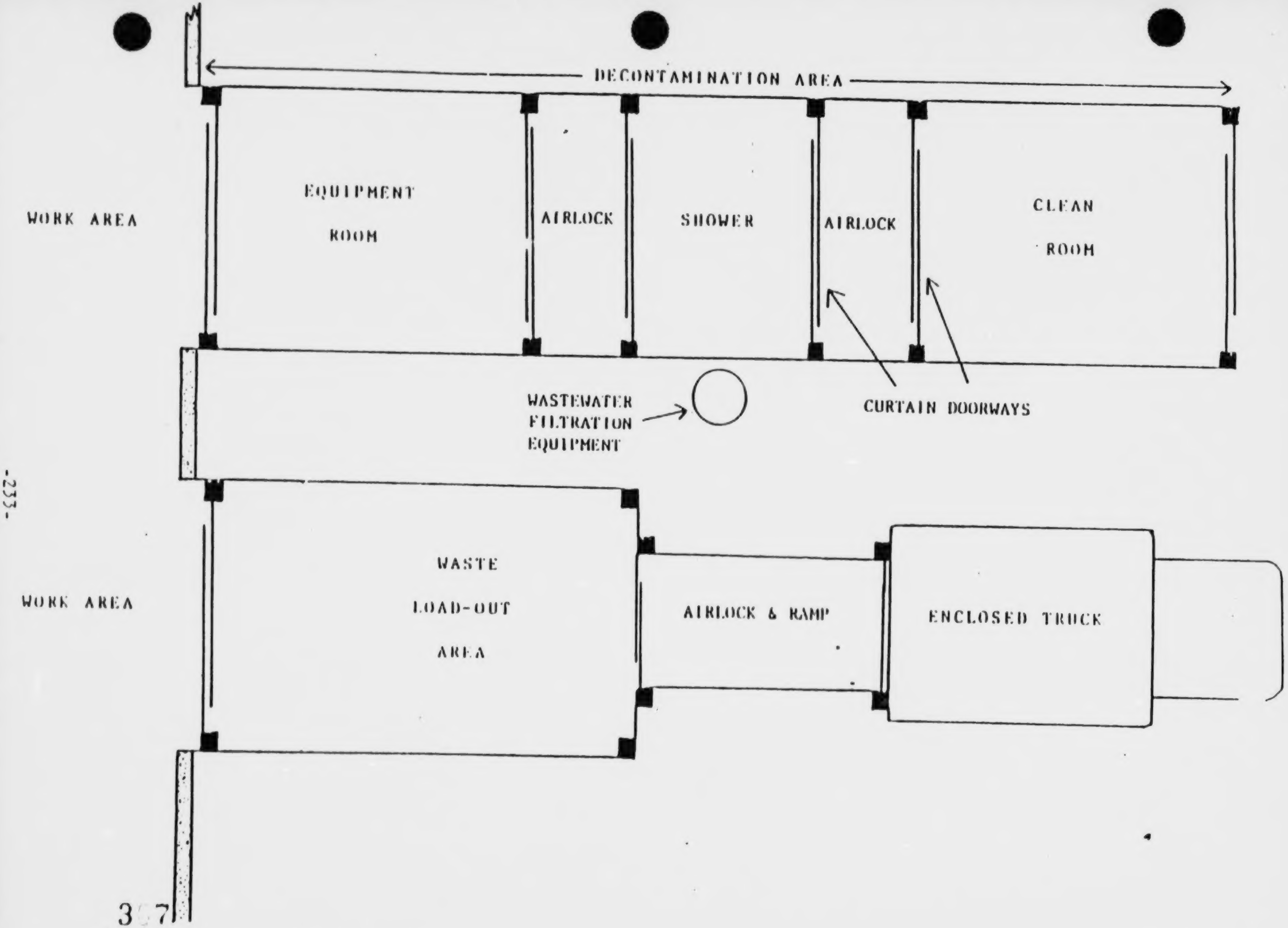

DECONTAMINATION AREA
WORK AREA
EQUIPMENT ROOM
AIRLOCK
SHOWER
AIRLOCK
CLEAN ROOM
WASTEWATER FILTRATION EQUIPMENT
CURTAIN DOORWAYS
WORK AREA
WASTE LOAD-OUT AREA
AIRLOCK & RAMP
ENCLOSED TRUCK

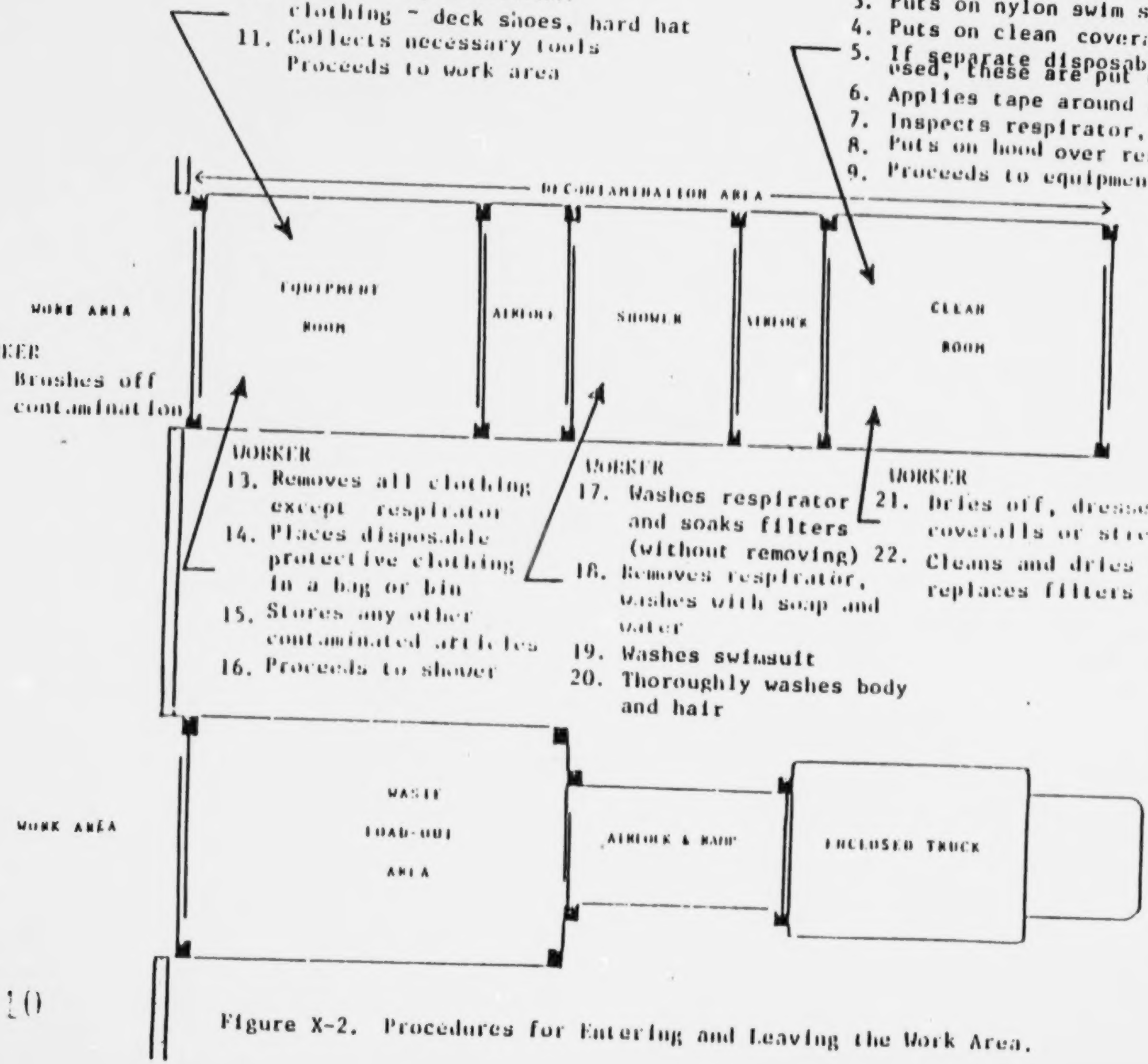
Figure X-1. Sketch of Typical Decontamination Area and Waste Load-out Area

Customized trailers which can be readily moved from one location to the next are also used as decontamination stations. These units typically cost $20,000 - $50,000 depending on the size and features. A company conducting work at many different locations would probably recover this initial investment over time.

Whether a decontamination station is constructed on-site or is in the form of a trailer, the basic design is the same. The major components and their uses are discussed below and illustrated in the following diagrams (Figures X-1 and X-2).

Clean Room - No asbestos-contaminated items should enter this room. Workers use this area to suit up, store street clothes, and don respiratory protection on their way to the work area, and to dress in clean clothes after showering. This room should ideally be furnished with benches, lockers for clothes and valuables, and nails for hanging respirators.

Shower Room - Workers pass through the shower room on their way to the removal area, and use the showers on their way out after leaving contaminated clothing in the equipment room. Although most job


DECONTAMINATION AREA
WORK AREA
EQUIPMENT ROOM
AIRLOCK
SHOWER
AIRLOCK
CLEAN ROOM
WORK AREA
WASTE LOAD-OUT AREA
AIRLOCK & RAMP
ENCLOSED TRUCK

Worker
1. Enters clean room
2. Removes clothing, places in locker
3. Puts on nylon swim suit (optional)
4. Puts on clean coveralls
5. If separate disposable foot coverings are used, these are put on
6. Applies tape around ankles, wrists, etc.
7. Inspects respirator, puts it on, checks fi
8. Puts on hood over respirator headstraps
9. Proceeds to equipment room

WORKER
10. Puts on any additional clothing - deck shoes, hard hat
11. Collects necessary tools
Proceeds to work area

WORKER
12. Brushes off contamination

WORKER
13. Removes all clothing except respirator
14. Places disposable protective clothing in a bag or bin
15. Stores any other contaminated articles
16. Proceeds to shower

WORKER
17. Washes respirator and soaks filters (without removing)
18. Removes respirator, washes with soap and water
19. Washes swimsuit
20. Thoroughly washes body and hair

WORKER
21. Dries off, dresses in clean coveralls or street clothes
22. Cleans and dries respirator, replaces filters (if applicable)

Figure X-2. Procedures for Entering and Leaving the Work Area.

specifications require only a single shower head, installation of multiple showers may be time and cost effective if the work crew is large. Shower wastewater should be collected and treated as asbestos-containing material or filtered before disposal into the sanitary sewer. State and local requirements on methods of shower wastewater disposal vary. For example, Alabama, Georgia, Maryland, and New Jersey which have written specifications for handling shower wastewater.

Equipment Room - This is a contaminated area where equipment, boots or shoes, hardhats, goggles, and any additional contaminated work clothes are stored. Workers place disposable clothing such as coveralls, booties and hoods in bins before leaving this area for the shower room. Respirators are worn until workers enter the shower and thoroughly soak them with water. The equipment room may require cleanup several times daily to prevent asbestos material from being tracked into the shower and clean rooms.

Waste Load-Out Area - This is an area separate from the decontamination unit which is used as a short term storage area for bagged waste and as a port for transferring waste to the truck. An enclosure can be constructed to form an airlock between the exit of the load-out area and an enclosed truck (see Figure X-2).

The outside of the waste containers should be free of all contaminated material before removal from the work area. Gross contamination should be wiped or scraped off containers before they are placed in the load-out area. Any remaining contamination should be removed by wet wiping or the bagged material can be placed in a second clean bag. To save cleanup time, fiber drums can be covered with an outside bag of polyethylene before they are taken into the work area which can be removed before taking the drum into the load-out area.

MATERIALS AND EQUIPMENT LIST FOR PREPARATION OF THE WORK AREA AND ESTABLISHING THE DECONTAMINATION STATION

Polyethylene Sheeting Material

Used to:

Seal off work areas and items within work areas; protect surfaces in the work area other than those being altered; construct decontamination and enclosure systems.

Types:

4 mil thickness	12' x 100' rolls	20 lbs
6 mil thickness	20' x 100' rolls	60 lbs

Duct Tape

Used to: Seam polyethylene sheets together; form airtight seal between polyethylene and wall; provide some support for vertical sheets.

Adhesive Spray

Used to: Seal seams; provide additional support to vertical sheets.

Furring Strips (cut into blocks)

Used to: Support vertical sheets of polyethylene.

Nails

Used to: Attach furring strips to top edge of polyethylene and then to the wall; construct the frame of the decontamination unit.

Staples & Staple Gun

Used to: Attach polyethylene to wood frame.

Retractable Razor Knives

Used to: Slice polyethylene and tape.

Warning Signs

Used to: Post entrances to building and decontamination unit.

Vacuum Cleaner Equipped with a High Efficiency Particulate Air (HEPA) Filter

Used to: Clean non-stationary items before removing them from the work area.

Ladders and/or scaffolding

Carpentry tools such as hammers, saws, etc.

Prefab shower stalls or materials for shower construction

NOT
APPROVED
BY DEQ
AT
THIS TIME

Asbestos Abatement Certification

Small-Scale Worker Instructor Guide

Prepared by Ron Sharman, Linn-Benton Community
College, Albany, OR and the Oregon State Department
of Education

Small-Scale, Short-Duration Asbestos Abatement

Draft Copy Notes:

This is a draft copy of a training program designed to accompany at least 16 hours of classroom time for small-scale, short-duration asbestos abatement workers. The outline given here fulfills requirements described under AHERA and worker certification requirements given by the Department of Environmental Quality. Materials in this manual were pulled from various EPA publications covering asbestos and asbestos abatement projects.

Small-Scale, Short-Duration Asbestos Abatement

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Asbestos Abatement Certification

Small-Scale Worker Instructor Guide

Introduction:

This Instructor Guide for small-scale, short-duration worker certification is designed to accompany a student manual for small-scale asbestos workers. The information contained in this guide is a collection of materials that are available from various public and private sources. It should be noted that the training materials, publications, and laws contained in this guide were compiled during the summer of 1988. Since accepted asbestos abatement techniques and state and federal laws are subject to revision on a continuous basis, these materials should be updated for each use.

The Student Manual:

The primary materials used in the student manual are excerpts from a full asbestos abatement training program produced under a grant from the EPA. This couse, "Interim Procedures and Practices for Asbestos Abatement Projects: Course #1", consists of a student manual, instructor manual, and instructional materials (slides and overheads). These course materials are available for loan from the Oregon State Department of Education or for purchase from the Environmental Protection Agency. See the instructional resources list for more information.

Other materials included in the student manual are EPA publications and Oregon State regulations covering the removal and disposal of asbestos. Updated copies of these regulations are available from the Accident Prevention Division and the Department of Environmental Quality.

Instructor Guide:

This guide is an attempt to be a collection of resources for any group planning to offer abestos abatement training. The major focus is for the small-scale, short-duration abestos abatement worker. Information supplied here can also be used for homeowner awareness programs and full-scale asbestos abatement training. Many of the publications listed are available from state and fereals sources.

Asbestos Abatement Certification

Instructor Guide

Contents:

Introduction
Section I: Course Outlines
Section II: Practice Quizes
Section III: Presentation Outlines
Section IV: Instructional Resources
Section V: State and Federal Regulations
Section VI: Course Accreditation
Section VII: Professional Contacts
Section VIII: EPA Example Publications

Asbestos Abatement Certification

Section I: Course Outlines

Course Outlines:

The following pages contain two approaches to the presentation of this program. The first outline, "Workshop Schedule", arranges the presentations to fit a two-day, 16 hour format. This schedule fulfills the minimum contact training time required under AHERA and DEQ guidelines. The second outline, "Class Schedule", spreads out the topics over a ten week, full term schedule.

Student Manual Contents:

The outline of the contents of the student manual are given here to give the course planner an idea of the background materials provided to the student in the student manual.

Asbestos Abatement Certification

Small-Scale Worker: Workshop Schedule

Day 1: Background Information

8:15 - 9:00	Introduction/Orientation • General knowledge pre-test
9:00 - 9:15	Break
9:15 - 10:15	Asbestos Terminology/ Physical Characteristics • Definitions and abbreviations • General types of asbestos and where they are found • Locations of ACBM in the school buildings • Recognition of damage, deterioration, and delamination of ACBM
10:15 - 10:30	Break
10:30 - 11:30	Health Effects of Asbestos Exposure • Asbestos-related diseases • Dose-response relationships • Latency period for disease
11:30 - 12:00	General Information/ Practice Quiz #1
12:00 - 1:00	Lunch
1:00 - 2:00	Federal, State, and Local Regulations • AHERA • NESHAPS • OSHA • APD • DEQ
2:00 - 2:15	Break
2:15 - 3:15	Asbestos Worker Protection • Employee personal protective equipment • Respiratory equipment • Medical monitoring
3:15 - 3:30	Break

3:30 -	4:30	State of the Art Work Practices • Planned O&M programs • Small-scale, short-duration projects • Full-scale asbestos abatement projects • Air monitoring • Personal hygiene • Worker safety hazards
4:30 -	5:00	General Information/Practice Quiz #2

Day 2: Safe Work Practices - Hands On Activities

8:00 -	8:30	Review of Day 1/ Questions/ Discussion
8:30 -	10:30	Section I: Employee Protection Equipment • Protective clothing • Selection, inspection, and use of respirators • Respirator fit-testing
10:30 -	12:30	Section II: Glovebag Techniques • Types and selection of glovebags • Asbestos removal techniques • Demonstration and class participation
12:30 -	1:30	Lunch
1:30 -	3:30	Section III: Mini-Enclosures • Objectives of enclosure systems • Construction and maintenance of barriers • Decontamination procedures • Demonstration and class participation • Safety in enclosures
3:30 -	4:00	General Information/Practice Quiz #3
4:00 -	5:00	Course Review and final test

Asbestos Abatement Certification

Small-Scale Worker: Class Schedule

Week 1 Introduction/Orientation
- General knowledge pre-test

Week 2 Asbestos Terminology/ Physical Characteristics
- Definitions and abbreviations
- General types of asbestos and where they are found
- Locations of ACBM in the school buildings
- Recognition of damage, deterioration, and delamination of ACBM

Week 3 Health Effects of Asbestos Exposure
- Asbestos-related diseases
- Dose-response relationships
- Latency period for disease

Week 4 General Information/ Practice Quiz #1

Federal, State, and Local Regulations
- AHERA
- NESHAPS
- OSHA
- APD
- DEQ

Week 5 Asbestos Worker Protection
- Employee personal protective equipment
- Respiratory equipment
- Medical monitoring

Week 6 State of the Art Work Practices
- Planned O&M programs
- Small-scale, short-duration projects
- Full-scale asbestos abatement projects
- Air monitoring
- Personal hygiene
- Worker safety hazards

Week 7	General Information/Practice Quiz #2 Section I: Employee Protection Equipment • Protective clothing • Selection, inspection, and use of respirators • Respirator fit-testing
Week 8	Section II: Glovebag Techniques • Types and selection of glovebags • Asbestos removal techniques • Demonstration and class participation
Week 9	Section III: Mini-Enclosures • Objectives of enclosure systems • Construction and maintenance of barriers • Decontamination procedures • Demonstration and class participation • Safety in enclosures
Week 10	General Information/Practice Quiz #3 Course Review
Week 11	Final Exam

Asbestos Abatement Certification

Section II: Practice Quiz

Practice Quiz:

In the small-scale worker training course, short practice quizes are included. These quizes are designed to be used as both a review tool at intermediate points during the training course and as general test practice to prepare the students for the certification exam. Three practice quizes are included in this section.

Small-Scale Worker Program

Practice Quiz #1

Directions: for each of the questions given below there is only one correct answer per question. Place an **X** next to the correct answer.

1. The abbreviation ACBM stands for:

    ___ a. anti-ballistic missile systems
    ___ b. asbestos concentration by microscope
    ___ c. asbestos containing building materials
    ___ d. none of these seem correct

2. Under the AHERA regulations, the one person for each educational agency that has responsibility for asbestos in that agencies buildings is:

    ___ a. the LEA designated person
    ___ b. the superintendent
    ___ c. the board chairman
    ___ d. all maintenance workers

3. All workers that work around asbestos in buildings must be:

    ___ a. trained in safe work practices
    ___ b. trained in worker protection techniques
    ___ c. accredited or certified
    ___ d. all of the above are true

4. Asbestos is a mineral that consists of long thin fibers. According to federal and state rules, an asbestos fiber is defined as a particle that is:

    ___ a. at least 3X longer than they are wide
    ___ b. deep blue in color
    ___ c. at least 5 microns in length
    ___ d. only a and c are correct

5. In the United States one type of asbestos is used in 90% of all applications including fireproofing, insulation, gaskets, etc.. This white colored asbestos is called:

___ a. chrysotile
___ b. crocidolite
___ c. amosite
___ d. tremolite

6. Asbestos containing materials range from soft and cottony to hard and brittle. What physical characteristics of asbestos make them commercially attractive?

___ a. flexible
___ b. fire proof
___ c. chemically inert
___ d. all of these make asbestos commercially attractive

7. One of the classifications of the potential hazard of asbestos materials in buildings is based on the physical condition of the material. If an asbestos surfacing material is considered friable, this means:

___ a. it can be crumbled into a dust by hand pressure
___ b. it has been dried out by heat (fried)
___ c. it can be baked into a hard glass-like material
___ d. it is in acceptable condition

8. The four response actions specified under AHERA are listed below. Under which response action does the operation and maintenance program fit?

___ a. repair and control
___ b. encapsulate
___ c. enclosure
___ d. removal

9. What is the purpose of the operations and maintenance program specified for buildings that contain asbestos materials?

___ a. clean up asbestos fibers previously released
___ b. prevent future fiber release
___ c. continuously monitor the condition of ACM
___ d. all are requirements of the O&M program

10. The greatest hazards or problems with asbestos in the human body occur when asbestos enters the body through the:

___ a. skin by absorption
___ b. respiratory system
___ c. digestive system by swallowing
___ d. ear or hearing system

11. When asbestos fibers reach the lung, the body tries to defend itself by surrounding the fiber with macrophages. This process usually causes what to happen in the lung?

___ a. scarring or fibrosis of the lung
___ b. the asbestos fibers are dissolved and removed
___ c. an increase in lung capacity
___ d. fireproofing of the lung

12. There are many types of human diseases associated with exposure to asbestos dust. Which asbestos related disease can be caused by short exposures to asbestos dust and results in a cancer of the chest cavity lining?

___ a. Pleural plaque disease
___ b. Asbestosis
___ c. Mesothelioma
___ d. Stomach cancer

13. The strongest proven link between smoking and asbestos exposure is the risk of lung cancer. Asbestos workers who also smoke have a risk of lung cancer that is how many times higher than normal?

___ a. 5 X higher
___ b. 10 X higher
___ c. 20 X higher
___ d. 50 X higher

14. The major asbestos related diseases all may develop 20 to 35 years or longer after the exposure. The time lag between the exposure to asbestos and the development of the disease is called the:

___ a. Synergistic relationship
___ b. Occurrence time lag
___ c. Disease development time
___ d. Latency period

15. What is the safe exposure level of asbestos fibers represented in terms of fibers per cubic centimeter (f/cc)?

___ a. 2 f/cc
___ b. 0.2 f/cc
___ c. 0.1 f/cc
___ d. there is no absolutely safe level of exposure

Small-Scale Worker Program

Practice Quiz #2

Directions: for each of the questions given below there is only one correct answer per question. Place an **X** next to the correct answer.

1. The federal regulation that dictated the procedures for inspection, maintenance, and removal of asbestos in schools is called:

___ a. OSHA
___ b. AHERA
___ c. NESHAPS
___ d. NIOSH

2. Which federal agency dictates and oversees the asbestos laws that are designed to protect the environment?

___ a. National Bureau of Standards
___ b. Department of Labor
___ c. Consumer Product Safety Commission
___ d. Environmental Protection Agency

3. Which regulatory agency in the State of Oregon controls the licensing and certification of asbestos workers?

___ a. Department of Environmental Quality
___ b. Department of Education
___ c. Department of Insurance and Finance
___ d. Department of Transportation

4. Which regulatory agency in the State of Oregon controls asbestos abatement working conditions and provides guidelines for protective equipment, apparel, and respirators?

___ a. Accident Protection Division
___ b. Department of Environmental Quality
___ c. Department of Labor
___ d. Department of Education

5. Regulatory guidelines specify what activities can take place under the small-scale, short-duration definition. Which activity listed below would fall under the small-scale project category?

___ a. removal of asbestos pipe insulation
___ b. minor repairs to damaged thermal system insulation
___ c. removal of small quantities of ACM as a part of other required maintenance activities
___ d. all of these activities are small-scale

6. Many employees that work around asbestos are required to participate in a medical surveillance program. Any employee must participate in a medical surveillance program when:

___ a. he works in a building containing asbestos
___ b. his work environment exceeds the action level
___ c. his work environment exceeds the permissible exposure level
___ d. he can spell the word asbestos

7. Respirators are required by law to be provided to and used by employees when:

___ a. his work environment exceeds the action level
___ b. his work environment exceeds the permissible exposure level
___ c. he enters a regulated work area
___ d. both b & c are correct

8. The OSHA respirator standard requires that only approved respirators should be used for the protection against airborne asbestos fibers. Which organization or group tests and approves respirators?

___ a. EPA
___ b. DEQ
___ c. NIOSH
___ d. APD

9. Air-purifying respirators used for asbestos work use a HEPA filter designed for particulate contaminants. What is the color code for the asbestos HEPA filter?

___ a. green
___ b. black with a white stripe
___ c. yellow and black stripes
___ d. magenta or purple

10. Half-mask air-purifying respirators equipped with a high efficiency filters (HEPA) can be worn in a working environment where the airborne concentration of asbestos fibers does not exceed:

___ a. 0.1 f/cc
___ b. 0.2 f/cc
___ c. 2.0 f/cc
___ d. 10 f/cc

11. Any employee who is assigned a respirator must be given the opportunity to wear the respirator and be fit-tested. The type of test that that exposes the respirator wearing employee to an irritant smoke and can only be evaluated on a pass/fail basis is called:

___ a. a positive fit test
___ b. a qualitative fit test
___ c. a smoke evaluation test
___ d. a quantitative fit test

12. Part of the operation and maintenance program is a listing of prohibited activities around asbestos materials. Which activity(s) listed below are prohibited?

___ a. sanding of ACM floor tile
___ b. drilling holes in ACM
___ c. removal of ventilation filters dry
___ d. all are prohibited

13. The small plastic bag used to enclose a small section of pipe during asbestos insulation removal is called:

___ a. a mini-enclosure
___ b. the orange disposal bag
___ c. a glove bag
___ d. the pipe capsule

14. Full-scale asbestos abatement projects require the use of full-scale enclosures and controlled ventilation. The machine used for ventilation control is called a:

___ a. negative-air machine
___ b. positive control blower
___ c. HEPA vacuum
___ d. 3 liter air pump

15. Disposal of asbestos debris should be done at a certified or approved landfill. Asbestos waste should be:

___ a. double bagged
___ b. shipped wet
___ c. shipped dry in a compressed form
___ d. both a & b are correct

Small-Scale Worker Program

Practice Quiz #3

Directions: for each of the questions given below there is only one correct answer per question. Place an **X** next to the correct answer.

1. Workers can be exposed to low levels of many substances without harmful effects. The permissible exposure limit (PEL) or threshold limit value (TLV) for asbestos exposure is 0.2 f/cc based on a time-weighted average (TWA). The TWA refers to:

   ___ a. the full shift work time
   ___ b. average number of days worked
   ___ c. work time vs. body weight
   ___ d. none of these are correct

2. What type of respirator should be used in an environment where there is enough oxygen and the air contaminants are within the approved range of the respirator?

   ___ a. air-purifying
   ___ b. air-supplied
   ___ c. self-contained
   ___ d. type "C" air systems

3. Filter cartridges that are approved for asbestos use high efficiency particulate air (HEPA) filters. HEPA filters are highly efficient woven filters that are designed to remove what percentage of the asbestos dust from the air going through it?

   ___ a. 54.2%
   ___ b. 85.57%
   ___ c. 99.97%
   ___ d. it's too small to be measured

4. Many respirators depend on the wearer's breathing energy to draw air though the cartridge. A PAPR respirator design uses a battery-powered blower to force the air through the cartridge or filter. PAPR stands for:

   ___ a. Pace-Applied Pure Respirator
   ___ b. Powered Air Purifying Respirator
   ___ c. Pleural Air Powered Respirator
   ___ d. Papus, Anderson, Poppy, & Right (brand name)

5. One of the most important parts of an effective respirator program is fit testing. When is the fit of the respirator tested?

___ a. when the respirator is first issued
___ b. once a month whether it's used or not
___ c. every time the employees put them on
___ d. answers a & c are correct

6. Both negative pressure checks and positive pressure checks are made to check the seal of the respirator. During the negative pressure check the employee:

___ a. covers the exhalation valve and exhales
___ b. is placed in a vacuum room
___ c. covers the filter cartridge inlets and inhales
___ d. holds the mask tightly against the face and exhales

7. It is important to understand why protective clothing is worn during asbestos repair and abatement work. Protective clothing should be worn to keep gross amounts of asbestos-containing materials off the body and to:

___ a. maintain an internal environment inside the suit
___ b. keep workers from contaminated each other
___ c. protect the worker from paints and solvents
___ d. minimize the changes of bringing asbestos out of the work area and into the home

8. Instead of isolating an entire room or building for an asbestos abatement project, it is sometimes possible to enclose only a small area to reduce the possibility of fiber release. Glovebags are small enclosures that are used for removal of:

___ a. asbestos floor tiles
___ b. sprayed-on fireproofing
___ c. asbestos pipe insulation
___ d. glovebags are used for all of these materials

9. Before the glovebag work begins, all necessary materials and supplies should be brought into the work area. The work area should be prepared by:

___ a. isolating the work area
___ b. warning signs should be posted
___ c. the HVAC should be shut down
___ d. all are pre-work practices

10. The glovebag is attached to the pipe by wrapping the top end of the bag over the pipe and sealing the top of the bag. The bottom of the bag is:

___ a. taped tightly to the pipe
___ b. cut open at the bottom for tool access
___ c. supported by a second worker
___ d. duct taped for reinforcement

11. After the glovebag is installed and sealed, the seal can be tested by:

___ a. using a smoke tube
___ b. spraying the outside of the bag with ammonia mist
___ c. inflating the bag with air
___ d. water testing the joints from the inside of the bag

12. Mini-enclosures are used for small-scale asbestos removal projects when the glovebag is either too small or not the correct shape for the project. Polyethylene plastic sheeting is used to:

___ a. protect the floor and wall material
___ b. contain the water used during wet methods
___ c. restrict the release of asbestos fibers
___ d. save the owner money

13. To provide decontamination for the worker in the restricted area the mini-enclosure construction includes:

___ a. an additional small change room
___ b. a small shower room
___ c. a three stage decontamination system
___ d. a disinfection pool

14. The advantages of mini-enclosures are that they limit the spread of asbestos contamination and are quick and easy to install. The disadvantage of the mini-enclosure is:

___ a. it closes off too much area
___ b. it is too small for a negative-air machine
___ c. it takes too much worker time
___ d. the increased cost of materials

15. Employees should be trained in emergency procedures to be used if the glovebag or mini-enclosure in use should rupture. Emergency procedures usually include:

___ a. sterilization of the building
___ b. wet cleaning and/or HEPA vacuuming
___ c. having a shower available
___ d. both b & c are correct

Asbestos Abatement Certification

Practice Quiz Answers

Practice Quiz #1: Answers

1. c
2. a
3. d
4. d
5. a
6. d
7. a
8. a
9. d
10. b
11. a
12. c
13. d
14. d
15. d

Practice Quiz #2: Answers

1. b
2. d
3. a
4. a
5. d
6. b
7. d
8. c
9. d
10. c
11. b
12. d
13. c
14. a
15. d

Practice Quiz #3: Answers

1. a
2. a
3. c
4. b
5. d
6. c
7. d
8. c
9. d
10. d
11. a
12. c
13. a
14. b
15. d

Asbestos Abatement Certification

Section III: Presentation Outlines

Lecture Outlines:

The Instructor's Notebook that accompanies the EPA Course #!, "Interim Procedures and Practices for Asbestos Abatement Projects", provides lecture outlines and slide narratives for each section. Should you decide to use these materials for your presentations these guidelines will be of great help. An instructor outline is included here as an example. A copy of the presentation outline and slide narrative "Health Effects of Asbestos Exposure" is given in the next few pages.

Hands-On Workshops:

Hands-on activities and experience is an integral part of asbestos abatement training and certification. Included as an example from EPA Course#1 are two hands-on workshop outlines and materials lists for the "Employee Protection Workshop" and the "Glovebag Workshop".

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HEALTH EFFECTS OF ASBESTOS EXPOSURE

Instructor's Notes:

The objective of this lecture is to instill in the course participant the seriousness of unnecessary asbestos exposure. You may wish to remind the attendee that it was the concern over the health effects caused by asbestos exposure that initiated the concern about asbestos in buildings. The following guidelines, to be used with the 35mm slides provided, are intended to provide a brief discussion of these health effects. If possible, it is best to call upon a physician to give this presentation. A medical doctor is often well respected and his words frequently carry a greater impact. The local Lung Association office may be a good contact to a physician with this expertise.

Slide	Script
No. 1 - Title & Objective	We have just seen in the previous discussion that many professions play important roles in correctly approaching an asbestos abatement project. It is often easy to forget that the reason, in most cases, that asbestos is being removed from the building is that it represents a potential health hazard to the building occupants. During this presentation, we will briefly examine some of the reasons for concern about asbestos. First, let us review the lung and how we breathe.

Slide	Script
No. 2 - Drawing of Lung	The primary concern over asbestos is associated with breathing the mineral fiber, asbestos, which has been shown to lead to an increased risk for developing certain lung diseases. While some have suggested that ingesting (eating/swallowing) fibers may lead to other diseases, there is little strong evidence at this time to support this conclusion. For this reason, we will concentrate primarily on the health effects associated with breathing asbestos fibers. The drawing before you is of a human lung. Air enters the lung through the trachea and bronchi before entering the small air sacs called alveoli. It is in these air sacs that the exchange of oxygen and carbon dioxide takes place.
No.3 - Lung Cavity	The lung sits in a cavity called the pleural cavity. This cavity is lined with a thin, transparent, plastic-like film. This lining is called the mesothelial lining. Actually, there exists another lining attached to the lung as well. These two linings are always moist and in contact with each other. In a manner similar to two panes of glass with a drop of

Slide	Script
	water between them, these two linings will move across one another, but are very difficult to pull apart. It is this particular quality that permits us to inhale and exhale. As the ribs and diaphragm expand, the pleural cavity lining also expands. Since this lining is "stuck" to the lining on the lung itself, the lung subsequently expands, allowing air to rush in. If either of these linings were damaged, we would experience severe difficulty in breathing.
No. 4 - Drawing of Gut Cavity	In this slide, we see that these linings are also found in the lower gut cavity. In this area, the mesothelial lining is called the peritoneum.
No. 5 - List of Asbestos and Associated Diseases	Asbestos has been shown to cause asbestosis and lead to an increased risk of contracting lung cancer, mesothelioma, and other cancers. These other cancers include cancer of the esophagus, stomach, pancreas, and colon. During this lecture, however, we will focus on the three major lung diseases (asbestosis, lung cancer, and mesothelioma.)

Slide	Script
No. 6 - Cut-away View of the Alveoli	In this slide, we see an enlargement of the air sacs we spoke of earlier. These air sacs are called the alveoli. The human lung has many thousands of these small air sacs where the exchange of oxygen and carbon dioxide occurs. The body has many defenses to keep unwanted dust, pollen, debris, and fibers out of the alveoli. First, large particles and fibers (greater than about 50 micrometers across) are filtered out through the nose and mucous membranes. Many smaller particles are then removed from incoming air as it travels down the trachea, bronchi, and smaller airways. Here particles are trapped on the mucous lining and swept upward to the back of the mouth to be swallowed or spit out. However, since many asbestos fibers are very small, they may reach the alveoli in the lungs.
No. 7 - Asbestos Fibers on Quarter (Chrysotile)	What happens when asbestos fibers such as these enter the alveoli? Actually, these fibers you see before you are bundles of thousands of fibers. The ones of real concern cannot be seen without a microscope.

Slide	Script
No. 8 - Side-by-side Picture of Alveoli	If an asbestos fiber gets past the other defenses of the lung, it will probably be attacked by a macrophage. These are giant cells which engulf and attempt to "digest" unwanted debris in the air sacs. Macrophages work extremely well on organic debris such as pollen or plant fiber. However, since asbestos is a mineral (rock), the macrophage cannot "digest" it. Failing to engulf the fiber, the body does the next best thing ... and encapsulates the fiber. If enough fibers are encapsulated in these spaces, true scar tissue begins to form. After the initial scar tissue forms, additional scar tissue continues to form in layers. Once enough scar tissue has formed, the symptoms of an asbestos-related disease begin to appear. This disease has been given the name asbestosis. Usually, a large exposure to asbestos over a prolonged period of time is necessary for this disease to occur.
No. 9 - Side-by-side X-ray Photographs	In this slide, we see what asbestosis looks like on X-ray. The milky-white sections in the lower lung fields are the scar tissues that have formed. Next to this x-ray, we see mesothelioma, a rare cancer of the mesothelial

Slide	Script
	lining we spoke of earlier. Mesothelioma is usually associated with past asbestos exposure and is always fatal. Further, there does not appear to be a strict dose-response relationship between exposure levels and the risk of contracting this disease. Many cases have been cited where a person was only exposed to asbestos for a brief period of time. Fortunately, however, the disease is still rare, even among asbestos industry workers.
No. 10 - Pleural and Peritoneal Mesothelioma	Mesothelioma can occur in the lung lining (75% of the time) or the gut lining (25% of the time.)
	(NOTE TO INSTRUCTOR: You may wish to expand on the discussion of mesothelioma at this time to include latency period (20-40 years), available treatment (none), etc.)
No. 11 - X-ray Showing Lung Cancer	In this slide, we see lung cancer which has progressed rapidly. Asbestos is only one of many possible causes of this disease. Unlike mesothelioma, there does appear to be dose-response relationship between asbestos exposure and developing lung cancer 10-30

Slide	Script
	years later. Put simply, this means the more one is exposed to asbestos, the more likely that lung cancer will develop. However, it is important to remember that no "safe" level of asbestos exposure has been documented and any exposure represents some risk.
No. 12 - Remember ... (text slide).	(NOTE TO INSTRUCTOR: Read slide aloud to participants.)
No. 13 - Smoker with Words "50X"	Smokers who are exposed to asbestos are over 50 times as likely to develop lung cancer than non-smokers who do not work with asbestos.
No. 14 - Text Slide: "15-45 Years Long Term Exposure"	The effects of asbestos exposure do not occur immediately, but usually take 15-45 years to show up. This means a 20 year old worker who is exposed to asbestos may not manifest one of the diseases we have discussed until he or she is 35 or 65 years old. For this reason, it is often difficult to make workers understand why it is so important to follow proper work practices and wear the protective equipment provided them.

Slide	Script
No. 15 - Medical Surveillance	(NOTE TO INSTRUCTOR: At this point, you may wish to simply remind the participants that medical surveillance is conducted to detect asbestos-related diseases early. You may also wish to outline a medical surveillance program in more detail if it will not be covered later in the course. See "Medical Surveillance" section for details.)

EMPLOYEE PROTECTION WORKSHOP

Objective: To provide hands-on training with respirators, protective clothing, and other personal protective equipment/apparel associated with asbestos abatement projects.

Learning Tasks: Information from this workshop should enable participants to:

- Become familiar with the various types of respirators available for asbestos abatement.
- Understand the functions of each component of a respirator, in addition to proper maintenance and inspection procedures.
- Become knowledgeable in selecting appropriate respiratory protection for various situations.
- Understand methods of respirator fit testing and its importance.
- Understand why it is necessary for asbestos abatement workers to wear protective clothing
- Understand the proper methods of donning protective clothing and how to maximize the protection factor.
- Become familiar with other forms of personal protective equipment that may be utilized on an asbestos abatement job site.

Materials/Equipment Needed

The following list of materials/equipment is a minimum guideline as to what should be provided in the employee personal protective workshop:

1. Disposal protective clothing - several brands, but enough to allow each participant to suit-up.

2. Disposal undergarments - several brands, but enough to allow each participant to suit-up.

3. Disposal booties - several brands, but enough to allow each participant to suit-up.

4. Rubber boots - nonskid soles, steel toes and shanks - several pair

5. Hard hats - 3 to 5

6. 1/2 mask dual-cartridge, high efficiency air-purifying respirators - 5 or 6

7. Full-face, dual-cartridge, high efficiency air-purifying respirators - 5 or 6

8. Type C respirators - 3 or 4 units

9. Air-Supplying Unit - compressor (manifold)

10. Airlines

11. Hood or helmet-type air-purifying device

12. Several examples of various types of cartridges available for air-purifying respirators (dusts, organic vapors, etc.)

13. Irritant smoke tubes - sufficient number to fit-test each course participant

14. A bucket, warm water with soap, and soft scrub brush - to demonstrate cleaning of respirator

15. Goggles, face shield - several examples

16. Gloves - various types (lightweight, nylon, cloth, etc.)

GLOVEBAG WORKSHOP

Objective: To provide hands-on training and experience in the proper utilization of the glovebag technique for asbestos removal from pipes.

Learning Tasks: Information from this section should enable participants to:

- Understand the logic associated with glovebagging as a method of asbestos removal.
- Become familiar with the tools and/or equipment needed to perform an effective glovebag operation.
- Become familiar with the various types of glovebags currently available and some of their advantages and disadvantages.
- Understand the methods by which glovebagging can best be accomplished.
- Be aware of the precautions that need to be observed in order to perform the job safely.

Materials/Equipment Needed

1. Glovebags - Examples of several types (approx. ten for hands-on training).

2. Pump-up garden sprayer - two or three

3. Amended water (surfactant) - in each garden sprayer

4. Duct tape (3" width) - Approx. ten rolls

5. Stapler and staples - five to ten sets

6. Small nylon scrub brush - ten

7. Several rags for each group

8. Several wettable cloths for each group

9. Smoke tubes with aspirator bulb - approx. ten

10. Disposable coveralls - enough for each workshop participant

11. 1/2 mask, dual-cartridge, high efficiency respirators - one for each workshop participant

12. 6 mil polyethylene disposal bags (labeled) - approx. ten

13. HEPA filtered vacuum cleaner - one or two

14. Bone saws (wire saws) - approx. ten

15. Utility knives with retractable blades - approx. ten

16. Wire cutters - approx. ten

17. Tin snips - five

18. One roll of polyethylene sheeting (four or six mil)

19. Asbestos warning signs - ten to fifteen

20. Sections of pipe wrapped with simulated asbestos - fifteen

21. Stands to hang pipes on - seven to ten

Workshop Set-Up

In order to optimize the learning value of this workshop, there should be a maximum of 15 to 20 people in the work area at any given time. Also, the area should be divided into two sections. The first section should be an area in which the instructor demonstrates a glovebag procedure, and the second section should be in an area where course participants can engage in some hands-on training.

Preparing the workshop area will involve setting up a number of pipes (i.e., vertical, horizontal) with simulated asbestos-containing insulation on them. These pipes should be easily interchangeable so that when all the insulation has been removed from one pipe, another one can easily be put in to replace it.

The total time of the workshop should be approximately 60 minutes, with 20 minutes of demonstration by the instructor, and 40 minutes of hands-on practical training.

It may be necessary for the agency presenting this training seminar to purchase many of the materials needed for the glovebag workshop (i.e., utility knives, bone saws, etc.). However, there are several items such as glovebags and HEPA vacuums that probably can be obtained through contacting a manufacturer or distributor and asking them if they would be interested in supplying the course with examples of their product.

After the initial demonstration by the instructor, participants should proceed to the hands-on training area where the various simulated working conditions have been set up. Details on what should be covered in each area of the workshop are outlined in the following sections.

Glovebag Demonstration

The instructor for this workshop should have a good understanding of the glovebag technique for removal of asbestos-containing materials. A person best suited for this role would most likely be either a contractor or a representative of a company that manufactures or distributes glovebags.

This part of the workshop is designed specifically to illustrate the logic behind glovebagging, describe the tools and/or equipment needed to perform the operation properly, and to demonstrate how an effective glovebagging procedure should be conducted. In addition to the demonstration, some of the various situations that might be encountered while glovebagging (i.e., hot pipes, hazardous chemical lines, etc.) should also be discussed.

Once the demonstration is complete, and all questions have been answered, the workshop participants should be divided into groups of not more than 3 or 4. Each group should then proceed to the hands-on training area of the workshop where they will each be given a chance to perform a glovebag asbestos removal operation.

Hands-On Training

After the groups of workshop participants have arrived in their individual hands-on training areas, they should be instructed to don their personal protective equipment (disposal coveralls, 1/2 mask dual-cartridge high efficiency respirators...at a minimum) to prepare themselves for conducting glovebag operations.

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Once the workshop participants are completely suited up, they can apply glovebags to the pipes and begin removing the simulated asbestos-containing insulation. The workshop instructor should move from group to group overseeing the operations, assisting those that require it, and answer any questions that might arise. All workshop participants should take a turn at removing a section of pipe lagging through the glovebag process.

It may be necessary during this section of the workshop, for the groups to share the HEPA vacuums and garden sprayers if sufficient numbers are not available to accommodate each group of participants. All other materials and/or equipment should be divided equally between each group.

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Section IV: Instructional Resources

Resources:

The following list of materials list multiple sources of written materials, slides, and video tape presentations. Some of these materials are available to copy, for rent, or for purchase. This is by no means a complete list.

Training Techniques:

The enclosed pages titled "Training Techniques" was adapted from the program "Train-The-Trainer: Asbestos Operations and Maintenance" produced by the National Asbestos Training Center, University of Kansas.

Resources for Asbestos Training

1. Accident Prevention Division (APD) - training materials and film library. All programs are available without charge from:

   Accident Prevention Division
   Rm #204 Labor and Industries Building
   Salem, OR 97310

   Call for film catalog: 503/378-3272

   Asbestos video programs:

   Asbestos , (V) 30 min (general)

   Asbestos Abatement: a Video Guide , (V) 64 min

   Asbestos Abatement: Routine Maintenance, (V) 15 min

   Asbestos Abatement: The Process , (V) 50 min

   Asbestos Orientation: Asbestos-Covered Pipes , (V) 50 min

   Asbestos: Controlling the Hazard , (V) 35 min

   Procedures for Asbestos Removal , (V) 10 min

   Sampling for Toxic Substances , 314 slides

   Testing Buildings for Asbestos , (V) 70 min

   Respiratory and other Safety programs:

   Breathe Easy , 103 slides

   Isoamel Acetete & Sweetener. Aerosol Orientation , 82 slides

   Respirators (4-part series) Atmosphere-Supplying Respirators, (V) 15 min

   To Your Health: Hazardous Materials in the Workplace , 74 slides

   Other general worker safety programs

2. Model Asbestos Accreditation Courses (EPA/Georgia Tech)

Course#1: Procedures and Practices for Asbestos Abatement Projects $112.85

Course#2: Model Curriculum for School Building Inspectors $112.17

Course#3: Model Curriculum for School Asbestos Management Planners $54.80

Course#4: Presentation to Accompany Guidance for Controllong Asbestos-Containing Materials in Buildings $16.81

Available from:

EPA AHERA Program   Attn: Joyce Doe
Atlis Systems, Inc. (301)770-3000
6011 Executive Blvd.
Rockville, MD 20852

3. EPA Seattle/ Asbestos in Schools

Walt Jaspers - 206/442-2632
Jerry Chastein - materials 206/442-8282

EPA Publications: Office of Toxic Substances

Asbestos in Schools: guidance for service and maintenance personnel, EPA: 560/5-85-018

Guidance for Controllong Asbestos-Containing Materials in Buildings, EPA: 560/5-85-024

- known as the "Purple Book"
- slide presentation available (56 slides) Course #4

Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials, EPA: 560/5-85-030a

Asbestos-in-Schools: A Guide to New Federal Requirements for Local Education Agencies,

Asbestos Waste Management Guidance, EPA: 530/SW-85-007

4. NIOSH Respiratory Protection Manuals

Respiratory Protection - A Guide to the Employee $1.50

GPO#: 017-033-00327-1
DHEW(NIOSH)#: 78-193B

Respiratory Protection - An Employers Manual $2.30

GPO#: 017-033-00326-2
DHEW(NIOSH)#: 78-193A

5. Industrial Training Systems Corporation
609/983-7300

Asbestos Videotape programs

(820-30) - Asbestos: Understanding the Hazards (V) 22 min; $460

(820-31) - Asbestos: Small-Scale Short Duration Operations (V) Part I 18 min, Part II 11 min; $575

(820-36) - Understanding Asbestos in the Workplace (V) 7.3 min; $250

(820-34) - Large Scale Asbestos Removal Operation (V) 25 min; $460

(820-33) - Managing Large Scale Asbestos Removal Operation (V) 13 min; $460

(820-35) - Outdoor Asbestos Removal (V) 25 min; $460

6. Carl R. Stekelenburg
PO Box 244
Pine Mountain, GA 31822

Asbestos Awareness Training Tape 90 min; $158.50
- aimed at 2 hr awareness training requirement

7. Asbestos Control Technology, Inc. (ACTI)

West Regional Headquarters:
Hayward Industrial Park
23751 Eichler St.
Hayward, CA 94545
1-800/525-2284

National Headquarters:
PO Box 183
Maple Shade, N.J. 08052
1-800-221-1911

Available training materials:

Asbestos Abatement Worker Training: A Video Orientation , (V) 59 min $89.95

Asbestos Abatement Workers Handbook, 135 p ; $19.95

A Video Guide to Negative-Air Filtration At Asbestos Abatement Sites (V) 42 min $89.95

Controlling Asbestos Contamination With Negative-Air Filtration Systems , 120 p $19.95

Encapsulation: Material & Equipment , (V) 17 min ; $39.95

Asbestos Hazard Management Guidebook: Guidebook to Abatement , 399p ; $45.00

Asbestos Removal in Occupied Buildings: Sophisticated Procedures for Structures with Operating HVAC Systems , text ; $14.95

Asbestos Abatement: A Video Guide to the Process , (V) 64 min ; $89.95

HEPA Vacuum Cleaners for Asbestos Abatement , (V)18 min ; $39.95

Surfactants for Asbestos Removal , (V) 18 min , $39.95

Asbestos in Buildings: A National Survey (USEPA) , 256 p ; $19.95

Asbestos Abatement: Risks & Responsibilities , 248 p ; $75.00

Asbestos in Schools and Other Buildings: A Laymen's Guide to the Legal Issues text ; $19.95

Asbestos Abatement & Removal: Legal Considerations and Planning , text ; $19.95

U.S. Attorney General's Asbestos Liability Report to Congress , 213 p ; $19.95

Asbestos Response Team Training Video , (V) 45 min ; $89.95

Asbestos Problems: A Public Awareness Video , (V) 20 min ; $89.95

Maintaining Asbestos-Covered Pipes & Surfaces: A Custodial Workers Video Guide , (V) 50 min ; $89.95

The Glove Bag Book , text ; $19.95

Custodial Asbestos Awareness & Glove Bag Removal Video , (V) 22 min $89.95

A Guide to Respiratory Protection For the Asbestos Abatement Industry (USEPA/NIOSH), 166 p ; $19.95

Asbestos Respirator Training Manual , 122 p ; $24.95

Respirators For Asbestos: A Video Orientation , (V) 30 min ; $89.95

Powered, Air-Purifying Respirators , (V) 18 min ; $39.95

Type-C Respirators Explained: A Video Guide to Supplied-Air Breathing Systems , (V) 90 min ; $89.95

Asbestos Safety Inspection & Air Monitoring Manual , 208 p ; $29.95

Asbestos Air Monitoring: A Comprehensive Video Guide , (V) ; $89.95

Testing Buildings for Asbestos Hazards , (V) 70 min ; $89.95

Personal Air Sampling Pump , (V) 12 min ; $39.95

8. Asbestos Abatement Council of AWCI
   (AWCI-Association of the Wall and Ceiling Industries)

Asbestos Abatement Council of AWCI
25 K Street N.E.
Washington, DC 20002

(202)783-2924

Series of nine training videotapes, total cost: $995.

Tape #1: Orientation

Tape #2: Worker Protection

Tape #3: Worker Safety

Tape #4: Equipment Operation

Tape #5: Sealing and Preparation of Work Area

Tape #6: Asbestos Removal

Tape #7: Encapsulation and Enclosure

Tape #8: Disposal Procedures

Tape #9: Final Clean Up and Inspection

TRAINING TECHNIQUES

The material in this manual is of little value unless it can be delivered by an instructor who conveys interest, confidence and authority. This section covers basic points that will aid you in acquiring or improving your teaching skills. Though step-by-step instructions and an actual script are provided for you to follow, a large amount of complex material is covered. Also, you will need to use a number of visual aids and demonstrations to reinforce your teaching points. The amount of effort you put into preparing yourself and your materials will be reflected in your presentation.

Preparation

1. Several weeks before the training session, go over each section carefully. Be sure that you understand the objectives of each section, in other words what specifically you want your students to learn. Ask yourself the following questions:

- Do I understand the material well enough to answer any questions that may be asked?

- Do I understand the sequence of the material, when to use slides or videotapes, and when to encourage discussion?

- Is any of the information outdated, or can I strengthen it by adding information about our own particular asbestos situation?

- Do I understand how to conduct each demonstration? Am I using the proper techniques?

2. Go over the script with a pencil or highlighter. Underline words you would like to emphasize, and shorten sentences that are too long or cumbersome. It's important that you adapt the script to your own speaking style so that you sound conversational, not awkward.

3. Check to make certain that the slides, handouts and other materials correspond with your scripted teaching points. Nothing is more embarrassing than discovering that your materials are not in their proper order – while in front of a group.

4. Decide whether you are more comfortable with a script or outline format. With experience, you may find an outline easier to work from (One advantage is that it prevents you from sounding as if you are "reading"). The very process of writing out a mental outline will help you remember the information.

5. Don't think that you just need to "go over" the script; a true rehearsal requires that you practice as much of your presentation as possible. If there is a slide show or demonstration, run through all of it, preferably in the room you are going to use. Be sure that you have all the materials necessary for conducting the demonstrationa nd for your students for their "hands-on" training.

6. Arrange the classroom so that all chairs are facing you. Keep the light bright, temperatures low, air moving and breaks frequent. Your audience's comfort level will help determine whether they pay attention and learn anything from you.

Delivery

How you look, sound, act and maintain the attention of the group contributes powerfully to the overall impact you make.

- Strive for a conversational tone.
- Avoid sounding monotone by emphasizing key points and varying your pitch.
- Maintain eye contact with your audience. If nervousness makes this difficult pick out 4 or 5 friendly faces and focus on these people. Walking around in front of the room may relieve tension and break down the psychological barrier between you and the class.
- Avoid repetitive, nervous mannerisms like coughing, pacing, or speaking rapidly and in a high pitched voice.
- Share experiences with your audience that they can relate to.
- Involve your audience whenever possible, particularly if you notice that their attention is wandering.
- If you don't know the answer to a question, say so, but let them know where they can go to obtain that information. Either that or take their name and get back with them after you have discovered the answer.

Introductory Remarks

1. It's imperative that you establish your credibility right from the beginning. Start off by explaining your background with the asbestos issue and other related experiences.

2. Explain that the course was developed by the National Asbestos Training Center and that it is being taught at schools across the country.

3. Point out why they are there, the importance of their involvement, and how it will benefit them personally. Also cover what they will learn, and how they can apply that knowledge to their job responsibilities.

4. Go over administrative details such as the timing of breaks, location of restrooms and refreshments.

5. Gain their interest and attention right from the start by involving them in the training. One good way is to have them explain any experiences they may have had with asbestos, and what they hope to gain from the class.

6. Remember that the pace you feel is probably ten times the pace the class feels - you are nervous and your head is racing to keep up with your next statement.

Asbestos Abatement Certification

Section V: State and Federal Regulations

Regulations:

Copies of state and federal regulations that apply to operation and maintenance, repair, and removal of asbestos are included here. Since this instructor's guide was put together during the summer of 1988, regulations that are given here may have been updated. It is recommended that you contact both APD and DEQ for current copies of these regulations (see Section VIII: Professional Contacts). Laws and regulations that are included:

Asbestos Hazard Emergency Response Act (AHERA)

Hazardous Air Contaminant Rules for Asbestos, OAR 340
  Division 25: emission standard and procedural requirements for hazardous air contaminants
  Division 33: licensing and certification requirements

Oregon Occupational Safety and Health Code; OAR 437
  Division 83: construction standards for asbestos
  Division 115: asbestos
  Division 129: protective equipment, apparel, and respirators
  Division 153: pipe labelling

federal register

Friday
October 30, 1987

Part III

Environmental Protection Agency

40 CFR Part 763

Asbestos-Containing Materials in Schools; Final Rule and Notice

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 763

[OPTS-62048E; FRL-3269-8]

Asbestos-Containing Materials in Schools

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: EPA is issuing a final rule under section 203 of Title II of the Toxic Substances Control Act (TSCA), 15 U.S.C. 2643, to require all local education agencies (LEAs) to identify asbestos-containing materials (ACM) in their school buildings and take appropriate actions to control release of asbestos fibers. The LEAs are required to describe their activities in management plans, which must be made available to all concerned persons and submitted to State Governors. This final rule requires LEAs to use specially-trained persons to conduct inspections for asbestos, develop the management plans, and design or conduct major actions to control asbestos. Exclusions are provided for LEAs which have previously conducted inspections and for LEAs subject to any state requirement at least as stringent as the comparable requirement in this final rule.

DATES: In accordance with 40 CFR 23.5, this rule shall be promulgated for purposes of judicial review at 1 p.m. Eastern Standard Time on November 13, 1987. This rule shall be effective on December 14, 1987. The incorporation by reference in the rule is approved by the Director of the Federal Register as of December 14, 1987.

FOR FURTHER INFORMATION CONTACT: Edward A. Klein, Director, TSCA Assistance Office (TS-799), Office of Toxic Substances, Environmental Protection Agency, Rm. E-543, 401 M St., SW., Washington, DC 20460, Telephone: (202-554-1404).

SUPPLEMENTARY INFORMATION:

I. Background

A. Description of the Enabling Legislation

On October 22, 1986, President Reagan signed into law the Asbestos Hazard Emergency Response Act (AHERA) which enacted, among other provisions, Title II of the Toxic Substances Control Act (TSCA) 15 U.S.C. sections 2641 through 2654. Section 203 of Title II, 15 U.S.C. 2643, requires EPA to propose rules by April 20, 1987 (180 days after enactment), and to promulgate final rules by October 17, 1987 (360 days after enactment), regarding: (1) The inspection of all public and private school buildings for ACM; (2) the identification of circumstances requiring response actions; (3) description of the appropriate response actions; (4) the implementation of response actions; (5) the establishment of a reinspection and periodic surveillance program for ACM; (6) the establishment of an operations and maintenance program for friable ACM; (7) the preparation and implementation of asbestos management plans by LEAs and the submission of the management plans to State Governors, who may review the plans and approve or disapprove them; and (8) the transportation and disposal of waste ACM from schools. This final rule implements the Title II requirements to issue the section 203 rules (except for transportation and disposal, as discussed further below).

Section 206 of TSCA Title II, 15 U.S.C. 2646, also requires EPA to issue by April 20, 1987, a final model accreditation plan for persons who inspect for asbestos, develop management plans, and design or conduct response actions. States are required to adopt an accreditation program at least as stringent as the EPA model within 180 days after the beginning of their next legislative session. Accreditation of laboratories which analyze asbestos bulk samples and asbestos air samples is also required by TSCA Title II. The National Bureau of Standards (NBS), U.S. Department of Commerce, is required to establish the bulk sampling accreditation program by October 17, 1987, and the air sampling accreditation program by October 12, 1988.

States were required to notify LEAs by October 17, 1987, regarding where to submit management plans. LEAs must submit those plans to their State no later than October 12, 1988. The plans must include the results of school building inspections and a description of all response actions planned, completed, or in progress. After receiving a management plan, States are allowed 90 days to disapprove the plan. If the plan is disapproved, the State must provide a written explanation of the disapproval and the LEA must revise the plan within 30 days to conform with the State's suggested changes. The 30-day period can be extended to 90 days by the State. LEAs are required to begin implementation of their management plans by July 9, 1989, and to complete implementation in a timely fashion.

Transport and disposal rules under TSCA section 203(h) have not yet been proposed. In accordance with TSCA section 204(f), therefore, LEAs shall provide for transportation and disposal of asbestos in accordance with the most recent version of EPA's "Asbestos Waste Management Guidance." Applicable provisions of that document are included as Appendix D of this rule. Regulations governing transport of asbestos-containing waste, including school waste already regulated by the National Emission Standard for Hazardous Air Pollutants (NESHAP) (40 CFR Part 61, Subpart M) under the Clean Air Act (42 U.S.C. section 7401, et seq.), were promulgated by the Department of Transportation (DOT) (49 CFR Part, 173 Subpart J). The NESHAP and DOT rules must be followed, according to the "Asbestos Waste Management Guidance." These rules will be sufficient to ensure the proper loading and unloading of vehicles and to ensure the physical integrity of containers.

Section 203(1) requires Department of Defense schools to carry out asbestos identification, inspection and management activities in a manner comparable to the manner in which an LEA is required to carry out such activities. EPA interprets the language of this section which states that such activities shall be carried out "to the extent feasible and consistent with the national security" as recognition that existing agreements with foreign governments may make it difficult to carry out certain provisions of this regulation.

Since this rule has been signed by the EPA Administrator by October 17, 1987, the rule has been promulgated within the statutory time frame required by section 203 of TSCA Title II. In accordance with 40 CFR 23.5, however, solely for purposes of judicial review deadlines under section 19 of TSCA Title I, the rule is considered to be promulgated at 1 p.m. eastern time, 14 days after publication in the Federal Register. Thus, the period in which petitions for review of this rule may be filed under section 19 commences 14 days after publication.

B. Previous EPA Asbestos Activities

EPA has undertaken a variety of technical assistance and regulatory activities designed to control ACMs in buildings and minimize inhalation of asbestos fibers.

1. *Technical Assistance Program.* Since 1979, EPA staff have assisted schools and other building owners in identifying and controlling ACM in their buildings. Through a cooperative agreement with the American Association of Retired Persons (AARP), EPA has hired architects, engineers, and

other professionals to provide on-site assistance to school officials and other building owners. With AARP assistance, many school officials and building owners have effectively and safely dealt with ACM in ways that are appropriate for the particular situation in their building.

In addition, EPA has published state-of-the-art guidance to help identify and control asbestos in buildings. EPA's principal asbestos guidance document, "Guidance for Controlling Asbestos-Containing Materials in Buildings," (EPA 560/5–85–024, also known as the "Purple Book") was expanded and updated in June 1985, based on recommendations from recognized national experts. The document provides criteria for building owners to use in deciding which abatement method is most appropriate for each particular situation.

An important EPA goal has been to provide training for people involved in all aspects of the identification and control of asbestos. EPA has established five Asbestos Information and Training Centers to provide information concerning the identification and abatement of asbestos hazards and to train people in proper asbestos abatement techniques. The five centers are located at the Georgia Institute of Technology in Atlanta, the University of Kansas in Kansas City, Tufts University in Medford, Massachusetts, the University of Illinois in Chicago, and the University of California at Berkeley. Courses attended by more than 8,000 building owners and managers, maintenance personnel, school officials, architects, consultants, and abatement contractors have been taught at the centers since December 1984.

Finally, because of the large number of asbestos abatement projects and the short-term nature of many of them, EPA believes that contractors should be State-certified and that States should oversee projects to ensure that they are properly performed. EPA has provided models for State certification legislation and start-up funding for the initiation of 38 State oversight programs.

2. *EPA's regulatory program.* In the **Federal Register** of May 27, 1982 (47 FR 23360), EPA issued a school identification and notification rule (hereinafter called the 1982 Asbestos-in-Schools Rule). This rule required school officials by June 28, 1983, to inspect all school buildings for friable materials, take a minimum of three samples of each type of friable material found, analyze samples using polarized light microscopy (PLM) to determine if asbestos is present, and keep records of the findings. (40 CFR Part 763, Subpart F)

School district officials who found friable ACM were required to notify employees of the location of the materials, post a notification form in the primary administrative and custodial offices and faculty common rooms, provide maintenance and custodial employees with a guide for reducing asbestos exposure, and notify parent-teacher associations or parents directly of the inspection results.

EPA also issued a rule to protect public employees who perform asbestos abatement work in those States not covered by the current asbestos standard issued by the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor. This rule (40 CFR Part 763, Subpart G) complements the OSHA asbestos regulations that protect private sector workers, and public employees in States with OSHA-approved State plans, from exposure to asbestos in occupational settings. The rule requires specific work practices, personal protective equipment, environmental monitoring, medical exams, and other provisions. The EPA rule also includes a provision not in the OSHA rule, i.e., notification to EPA generally 10 days before an asbestos abatement project is begun when public employees are doing the work. OSHA issued revised regulations regarding occupational asbestos exposure published in the **Federal Register** of June 20, 1986 (51 FR 22612). EPA issued in the **Federal Register** of February 25, 1987 (52 FR 5618), a revision of its worker protection rule to make it consistent with the new OSHA regulations.

3. *Recent developments.* EPA issued an Advance Notice of Proposed Rulemaking (ANPR) on August 12, 1986 (51 FR 28914), entitled "Asbestos-Containing Materials in Schools: Inspection, Notification, Management Plans and Technical Assistance." The purpose of this ANPR was to solicit comments on the future direction of EPA's program to reduce risks from asbestos in schools and to solicit information about a variety of technical and policy issues.

Prior to enactment of TSCA Title II, EPA had also initiated development of two new guidance documents on asbestos control. One document was being developed to provide more detailed guidance about assessing ACM in buildings and selecting abatement actions. A second document was being developed to provide more detailed guidance about practices and procedures which should be included in an operations and maintenance program. Both documents had been developed with the assistance of panels of national experts who convened in Washington, DC to discuss technical and operational issues associated with these subjects. The work done in these two guidance documents has been valuable in developing provisions of this rule.

Also, in 1986, EPA, in cooperation with the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, published "A Guide to Respiratory Protection for the Asbestos Abatement Industry" to provide practical guidance in the selection and use of respiratory protection to persons who work in asbestos abatement. The "Guide" also provides information relevant to other work activities, such as maintenance or repair, where the exposure to asbestos or the potential for exposure exists. The "Guide" was updated in September 1986 to include the text of the OSHA June 1986 revision of its asbestos standard.

C. Development of the Rule

The April 1987 proposed rule was developed through the process of regulatory negotiation, an alternative process for developing regulations in which individuals and groups with negotiable interests directly affected by the rulemaking work together with EPA in a cooperative venture to develop a proposed rule by committee agreement. The negotiation group was established as a Federal Advisory Committee and consisted of representatives of national educational organizations, labor unions, asbestos product manufacturers, the environmental community, asbestos abatement contractors, professional associations of architects, consulting engineers, industrial hygienists, States, and EPA.

After an organizational meeting in Washington, DC on January 23, 1987 (announced in the **Federal Register** of January 13, 1987, 52 FR 1377), the committee was established with 23 interests represented. Meetings were scheduled on February 5 and 6, February 17 and 18, March 9 and 10, March 26 and 27, and April 1 thru 3. During the March 10, 1987, meeting, the plenary session of the Committee accepted two more parties on the committee, one taking a seat representing State attorneys general, the other (representing big city schools) sharing a seat with a previously seated member representing big city schools.

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Members of Negotiating Committee

The members of the negotiating committee and their interest represented are as follows:

1. Allen Abend, Council of Chief State School Officers.
2. Bill Borwegen, Service Employees International Union/Jordan Barab, American Federation of State, County, and Municipal Employees (school service employees).
3. Dr. William Brown, Baltimore City Schools/Michael Young, New York City Law Department (big city schools).
4. Brian Christopher, Committee on Occupational Safety and Health.
5. Donald Elisburg, Laborers' International Union and Laborers-AGC Education and Training Fund.
6. Kellen Flannery, Council for American Private Education.
7. Steve Hays, asbestos abatement engineer.
8. Jesse Hill, manufacturers of asbestos pipe and block insulation products.
9. Edward Kealy, National School Boards Association.
10. Lloyd A. Kelley, Jr., Superintendent of Schools Rutland S.W. Vermont, Supervisory Union (rural schools).
11. William Lewis, Manufacturers of asbestos surfacing products.
12. Lynn MacDonald, Sheet Metal Workers International Association.
13. Claudia Mansfield, American Association of School Administrators.
14. Roger Morse, American Institute of Architects.
15. David Ouimette, Colorado Department of Health (States with developing asbestos programs).
16. Joel Packer, National Education Association.
17. Robert Percival, Environmental Defense Fund.
18. Miriam Rosenberg, National PTA.
19. Paul Schur, Connecticut Department of Health/Dr. Donald Anderson, Illinois Department of Public Health (States with implemented asbestos programs).
20. Robert Sheriff, American Industrial Hygienists Association.
21. David Spinazzolo, Association of Wall and Ceiling Industries (asbestos abatement contractors).
22. Susan Vogt, U.S. E.P.A.
23. John Welch, Safe Buildings Alliance (former manufacturers of asbestos products).
24. Margaret Zaleski, National Association of State Attorneys General.

Facilitation Team and Executive Secretary

Owen Olpin, Consultant to EPA
Eileen B. Hoffman, Federal Mediation & Conciliation Services
Kathy Tyson, U.S. E.P.A. (Executive Secretary)
Leah Haygood, The Conservation Foundation
Dan Dozier, Federal Mediation & Conciliation Services
John Wagner, Federal Mediation & Conciliation Services

The committee met in plenary sessions as well as in four work groups. Each work group focused on a cluster of related issues and reported to the plenary on options and recommendations. The plenary retained all decision-making power of the committee and often gave guidance to work groups. Generally, for each day of a plenary session, work groups convened the day before to prepare reports for the plenary. Neutral facilitators were present at all work group and plenary meetings to assist the negotiations in moving forward.

At the end of the 2-month negotiating process on April 3, 1987, and after extensive efforts, the committee was in general agreement on the vast majority of issues before it for the purposes of the proposal. Agreement to solicit further comment about alternatives was often important in developing provisions to be included as proposals. At the close of the negotiations, some items remained at issue and were not subject to universal agreement. These consisted of the following: definitions and response actions for damaged and significantly damaged thermal system insulation ACM (relates to being deemed nonfriable in the inspection section) and damaged and significantly damaged friable surfacing and miscellaneous ACM. Also, the definition of asbestos debris and the nature of cleaning practices (initial and routine) for friable ACBM or damaged or significantly damaged thermal insulation under the operations and maintenance section were still at issue. While extending negotiations beyond April 3, 1987, may well have enabled the committee to resolve these issues, the Congressional April 20, 1987, deadline for issuing a proposed rule precluded this possibility. Although **Federal Register** practices precluded the Agency from highlighting these issues in the text of the proposed rule, the public docket contains a copy of the proposed rule which clearly identifies the sections which contain these unresolved issues.

On April 3, 1987, the facilitators prepared, for members' signatures, statements supporting the use of the agreed-on portions of the regulatory language as a basis for a Notice of Proposed Rulemaking. Members representing 20 of the 24 interests seated on the committee signed these statements. Members representing 4 of the interests seated on the committee did not sign the statements, due to the status of the unresolved issues described above. Mr. Paul Schur, a corepresentative of states with an implemented asbestos program (an interest that did not sign), signed in an individual capacity. All committee members, signatories and non-signatories alike, retained for themselves and for their constituencies all rights which bear on the rulemaking, including the right to comment fully during the public comment period.

Notably, signatories supporting the agreed-on regulatory language as a basis for a Notice of Proposed Rulemaking did so in considering that language as a whole. The proposed rule's agreed-on language was not necessarily ideal from any one party's perspective.

On April 17, 1987, the EPA Administrator signed the proposed rule developed through the negotiated rulemaking process. The proposed rule and the final Model Accreditation Plan were published in the **Federal Register** of April 30, 1987. EPA's decision to use the results of the negotiated rulemaking process as a basis for a proposed rule was explained in the April 30 document (52 FR 15833).

The 60-day public comment period ended on June 29. During this time period, EPA staff conducted 10 Regional briefings on the proposed rule for State officials and a number of additional briefings for interested parties. These parties included school administrators, school board officials and building owners. At the conclusion of the public comment period, the Agency had received over 170 comments on the proposed rule.

Several comments received by EPA requested the Agency to hold a public hearing on the proposed rule. As a result of these comments, EPA conducted public hearings on August 25 and 26. Over 25 individuals representing a variety of groups testified before EPA. The testimony and transcript from the public hearing were included in the rulemaking's docket.

D. Basis for EPA's Decision

After consideration of the proposed rule and all the evidence in the rulemaking record, including public comments on the proposed rule, EPA has decided to promulgate a final rule which is like the proposal in most respects. A relatively small number of changes have been made from the proposal to reflect public comments. In a number of cases EPA decided not to make changes suggested by public comments. The Agency discusses its response either in this preamble or elsewhere in the rulemaking docket.

EPA has determined that the regulations being announced in this edition of the **Federal Register** use the least burdensome methods which protect human health and the environment. This determination is supported by the discussion in this preamble and the entire rulemaking record. EPA adopts as the reasoning supporting its final rule the same basic reasoning in the preamble to the proposed rule (52 FR 15833). The provisions of this rule represent a reasonable way to carry out the statutory responsibilities of TSCA Title II.

EPA's analysis of risk placed in the rulemaking record when the proposed rule was issued shows that asbestos in schools could present a risk of concern and that the measures required by this rule are necessary to protect public health and the environment. EPA, as discussed later in this preamble, continues to rely on that risk analysis for support of the final rule. While there may be a wide divergence of opinion as to the actual health effects from asbestos exposure in schools, EPA believes there is little doubt that the decisionmaking process established by this rule needs to be implemented. This process is based on the responsibility of local officials, with input from the local community and with assistance from specially-trained experts, to develop management plans to implement appropriate measures that will abate the risk of asbestos in particular schools depending upon local circumstances.

This decisionmaking process ensures that the costs associated with this rule will be reasonable while protecting health and the environment. EPA has revised its costs somewhat from the analysis in its proposal, but has not changed its decision that these costs are reasonable. The detailed revisions to the Agency's costs analysis are discussed later in this preamble and in the rulemaking record. All public and private schools will experience the cost of a building walkthrough and visual inspecting, which EPA has determined will not exceed a few hundred dollars per school. Many schools, finding no asbestos, will experience no further costs. Most of the remaining schools that find ACM are expected to implement operations and maintenance programs along with training, periodic surveillance and reinspection. EPA has in fact revised downward the cost of the typical school asbestos program. It is expected that this cost will be about $5,530 per school year, a cost that is clearly minimal if there is a possibility that adverse health effects may be avoided. EPA also notes that some portion of the cost of the typical school program will not involve expenditures by the schools but are so-called "opportunity costs." These are costs assigned to the time spent by school employees in carrying out the activities required by the regulation. While these are real costs of the program, EPA expects that many schools will be able to conduct the typical school program through use of existing employees. Thus, the costs of the program will appear to the individual school officials and local communities to be somewhat less than EPA's economic analysis shows.

The decisionmaking process, summarized above and discussed in detail elsewhere in the preamble and rulemaking record, will ensure the reasonableness of other more extensive response actions for particular schools.

II. Provisions of the Final Rule

A. Introduction

This unit describes the various provisions of the final rule. The changes to the proposed rule made by the Agency based on comments received during the comment period are noted. Following a discussion of applicable regulatory definitions in Unit B and general responsibilities in Unit C., inspections and reinspections, sampling and analysis, and assessment of materials are discussed in Units D., E., and F., respectively. In Unit G., the major elements of the management plan, availability of the plan, and review of the plan by Governors are discussed.

Unit H. describes requirements for response actions to be taken by LEAs under circumstances described in that section. Unit I. explains requirements for training and periodic surveillance, and Unit J. explains air sampling requirements for determining when a response action has been completed.

Unit K. discusses requirements to use accredited persons to inspect buildings for asbestos, develop management plans, and design or conduct response actions. Requirements to protect abatement workers, custodial and maintenance staff, and building occupants are explained in Unit L.

Waivers for all or part of a State asbestos program are described in Unit M., including information required in the waiver request and the process for granting or denying such waivers. Requirements for recordkeeping and enforcement provisions are described in Units N. and O., respectively.

B. Definitions

Several important definitions (§ 763.83) are discussed below.

"Asbestos-containing building material (ACBM)" encompasses surfacing ACM, thermal system insulation ACM, and miscellaneous ACM in or on interior parts of the school building. These include specified exterior portions of school buildings that, for the purposes of this rule, may fairly be considered interior parts. EPA focused upon interior building materials because, in the Agency's experience, such materials represent a very large percentage of ACM in schools and appear to pose the greatest hazards to occupants.

The definition of "school building," in the rule however, makes it clear that exterior hallways connecting buildings, porticos, and mechanical system insulation are considered to be in a building and are subject to jurisdiction under TSCA Title II. The Agency believes that these exterior areas, by virtue of the accessibility of the ACM found there, warrant inclusion under the rule. Often, these exterior areas are connected to interior areas and could be considered to be a single homogeneous area in terms of a removal project design.

"Asbestos debris" is defined as pieces of ACBM that can be identified by color, texture, or composition. The definition also includes dust, if the dust is determined by the accredited inspector to be asbestos-containing. The Agency included dust in the definition based on public comments.

"Damaged or significantly damaged thermal system insulation ACM" is defined as ACM on pipes, boilers, and other similar components and equipment where the insulation has lost its structural integrity or its covering in whole or in part, is crushed, water-stained, gouged, punctured, missing or not intact such that it is not able to contain fibers. Damage may further be illustrated by occasional punctures, gouges, or other signs of physical injury to ACM; occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints. Asbestos debris originating from adjacent ACBM may also indicate damage. This definition allows that, even though the insulation is marred, scratched or otherwise marked, it may not be, in the judgment of the accredited expert, damaged so as to release fibers. This definition varies from the proposed rule's language by providing more specific guidance on the physical characteristics that may constitute damage. An accredited inspector shall classify this material based upon a determination of damage or significant damage (§§ 763.85 and 763.88) and an accredited management planner shall recommend in writing appropriate response actions (§ 763.93).

"Damaged friable surfacing ACM" is defined as ACM which has deteriorated or sustained physical injury such that the cohesion of the material or its adhesion to the substrate is inadequate, or which, for any other reason, lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separating of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; or significant or repeated water stains, scrapes, gouges, mars, or other signs of physical injury on the ACM. Asbestos debris originating from adjacent ACBM may also indicate damage. The definition allows that such surfacing material may show signs of water damage or physical injury without, in the judgment of the accredited expert, always demonstrating a lack of fiber cohesion or adhesion. This definition varies from the proposed rule's language by providing more specific guidance on the physical characteristics that may constitute damage. Accredited experts will classify material based upon a determination of damage and recommend appropriate response actions (§§ 763.85, 763.88, and 763.93).

"Miscellaneous ACM" includes a wide variety of materials in buildings, such as vinyl flooring, fire-resistant gaskets and seals, and asbestos cement. Damage to these materials is defined by the same cohesion and adhesion (if appropriate) properties as surfacing materials. The Agency believes this definition is sufficiently general to provide a reasonable approach to assessing damage to so wide a range of materials.

"Significantly damaged friable surfacing ACM" is defined as material in a functional space where the damage is extensive and severe. (The definition of significantly damaged friable miscellaneous ACM closely parallels the definition for significantly damaged surfacing ACM.) Again, this determination of significant damage will be made by accredited experts (§§ 763.85, 763.88, and 763.93).

This definition is a function of two major factors. The first factor deals with extent, or scope, of damage across a functional space. The Agency, in draft guidance, suggested that damage evenly distributed across one-tenth of a functional space or localized over one-quarter represented significant damage (See Seventh Draft Report, "Guidance for Assessing and Managing Exposure to Asbestos in Buildings," November 7, 1986, p. 9). This represents a level of damage which a panel of experts, convened by the Agency, believed was generally, although perhaps not always, unreasonable to repair or restore.

The second factor involves the degree or severity of the damage itself. A major delamination of asbestos material, for instance, constitutes damage which is more severe than slight marks or mars. ACM, in the accredited expert's judgment, may be so severely damaged that there is no feasible means of restoring it to an undamaged condition.

Material has potential for significant damage as opposed to only potential for damage if it is subject to major or continuing disturbance, due to factors such as accessibility (i.e., subject to disturbance by school building occupants or workers in the course of the normal activities), or, under certain circumstances, vibration or air erosion. For example, material within reach of students above an entrance is clearly accessible. Thermal system insulation running along the base of a wall in a boiler room is also accessible. Material on the ceiling of a school auditorium, beyond the reach of students, is not. ACM on a high school gymnasium ceiling, which might be reached with basketballs or other objects, is subject to either classification, although an LEA might be well advised in this instance to implement a preventive measure to avoid disturbance.

EPA believes a wide range of "preventive measures" exist. One example is the installation of a stop to prevent a door from striking (and damaging) thermal system insulation ACM behind it. Another might involve restricting access of a corridor with surfacing ACM on a low ceiling, where students continually marred and vandalized the material. The problem of high school students hitting the gym ceiling with basketballs may be eliminated by a policy prohibiting such activities, if it can be effectively implemented. LEAs, in consultation with maintenance staff and, if desired, accredited experts, will identify a variety of creative and effective means of eliminating potential damage or significant damage to ACM.

If, however, such preventive measures cannot be effectively implemented, other response actions, including removal, will be required. The Act is clear that EPA, as part of its rulemaking, direct LEAs to mitigate those circumstances which involve potential for significant damage.

Based on public comments, the Agency added the terms "air erosion" and "vibration" to increase the specificity of the "potential significant damage" definition in the rule.

The "enclosure" definition requiring an airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air does not contemplate a vacuum-sealed area which is impossible to access. Instead, this definition, based on the National Institute of Building Sciences' (NIBS') "Model Guide Specifications, Asbestos Abatement in Buildings," July 18, 1986, is associated with precise engineering specifications, found in section 09251 and elsewhere in the NIBS' Model Guide, to construct enclosures sufficient to prevent fiber release. Also, this term, from the standpoint of permanence, is not intended to apply to mini-enclosures described in the EPA worker protection rule or Appendix B of the regulation, as these enclosures are used temporarily for repair or abatement activities.

"Functional space" is a term of art used by the accredited expert to appropriately characterize an area as containing "significantly damaged friable surfacing ACM" or "significantly damaged friable miscellaneous ACM." The "functional space" may be a room, group of rooms, or a homogeneous area, as determined appropriate by the accredited expert. Note that the functional space includes the area above a dropped ceiling as well as crawl spaces.

C. LEA General Responsibilities

The final rule requires LEAs to designate a person to carry out certain duties and ensure that such person receives training adequate to perform the duties.

Section 763.84 requires LEAs to ensure that: (1) Inspections, reinspections, periodic surveillance and response action activities are carried out in accordance with the final rule; (2) custodial and maintenance employees are properly trained as required by this final rule; (3) workers and building occupants are informed annually about inspections, response actions, and post-response action activities including reinspections and periodic surveillance; (4) short-term workers (e.g., telephone repair workers) who may come in contact with asbestos in a school are provided information about locations of asbestos-containing building material (ACBM); (5) warning labels are posted as required by this final rule; and (6) management plans are available for review and that parent, teacher, and employee organizations are notified of the availability of the plan.

Lastly, LEAs shall consider whether any conflict of interest may arise from the interrelationship among accredited personnel (e.g., the management planner and abatement contractor) used by the LEAs and whether that should influence the LEA's selection of accredited personnel. EPA added this provision after reviewing public comments.

D. Inspections and Reinspections

1. *Inspections.* Section 763.85 requires LEAs to have an accredited inspector visually inspect all areas of each school building to identify locations of all friable and nonfriable suspected ACBM, determine friability by touching, and either sample the suspected ACBM or assume that suspected materials contain asbestos. The inspector must then develop an inventory of areas where samples are taken or material is assumed to contain asbestos. Finally, the accredited inspector is required to assess the physical condition of friable known or assumed ACBM as required under § 763.88.

2. *Exclusions.* Section 763.99 defines conditions that would exclude an LEA from all or part of the initial inspection. The accredited inspector is a key element in the exclusion process. For all inspection exclusions, areas previously identified as having friable ACM or nonfriable ACM that has become friable have to be assessed as required under § 763.88. All information regarding inspection exclusions shall be placed in the management plan.

Five types of exclusions for LEAs are provided in the final rule. First, LEAs do not need to have an initial inspection conducted in specific areas of a school where ACBM has already been identified. Second, if previous sampling of a specific area of the school indicated that no ACM was present, and the sampling was done in substantial compliance with the final rule, the LEA does not have to perform an initial inspection of that area. Third, LEAs do not have to inspect specific areas of schools where records indicate that all ACM was removed. Fourth, LEAs can receive an inspection exclusion for schools built after October 12, 1988 (the date when management plans are to be submitted to Governors), if no ACBM was specified for use in the school. Fifth, States that receive a waiver from the inspection requirements of the rule can grant exclusions to schools that had performed inspections in substantial compliance with the rule.

3. *Reinspections.* Section 763.85(b) requires LEAs to have accredited inspectors conduct reinspections at least once every 3 years. The inspector must reinspect all known or assumed ACBM and shall determine by touching whether nonfriable material has become friable since the last inspection. The inspector may sample any newly friable materials or continue to assume the material to be ACM. The inspector shall record changes in the material's conditions, sample locations, and the inspection date for inclusion in the management plan. In addition, the inspector must assess newly friable known or assumed ACBM, reassess the condition of friable known or assumed ACBM, and include assessment and reassessment information in the management plan.

Section 763.85(c) states that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap is treated as nonfriable. Based on public comments, EPA changed the wording in this section from "deemed" nonfriable to "treated as" nonfriable.

E. Sampling and Analysis

1. *Sampling.* Section 763.86 permits the LEA to assume that suspected ACBM is ACM. If the LEA does not assume suspected ACBM to be ACM, the LEA shall use an accredited inspector to collect bulk samples for analysis.

EPA expects that a school is likely to sample only friable suspected ACBM. For nonfriable suspected ACBM, EPA anticipates most schools will assume this material contains asbestos. However, the final rule does not preclude a school from sampling all of its suspected ACBM, both friable and nonfriable. Sampling of friable surfacing materials should follow the guidance provided in the EPA publication "Simplified Sampling Scheme for Friable Surfacing Materials" (EPA 560/5-85-030a). To determine whether an area of surfacing material contains asbestos, sufficient samples shall be taken in a statistically random manner to provide data representative of each homogeneous area being sampled.

In most cases, sampling of thermal system insulation requires an accredited inspector to take at least three randomly distributed samples per homogeneous area. The final rule includes three exceptions to this requirement for sampling of thermal system insulation. First, an accredited inspector can determine through visual inspection that the material is non-ACM (e.g., fiberglass). Second, only one sample is required for patched homogeneous areas of thermal system insulation. Third, an accredited inspector needs to collect an appropriate number of samples to determine whether cement or plaster tees are ACM.

For friable miscellaneous material or nonfriable suspected ACBM, an accredited inspector must collect bulk samples in an appropriate manner.

2. *Analysis.* Section 763.87 requires analysis of bulk samples by laboratories accredited by NBS. In the period before NBS has developed its accreditation program, laboratories which have received interim accreditation from EPA may be used to analyze samples. The interim program is explained in a notice in the **Federal Register** (52 FR 33470, September 3, 1987). After receiving the sample results, the LEA must consider an area to contain asbestos if asbestos is present in any sample in a concentration greater than 1 percent. Compositing of samples (mixing several samples together) is prohibited.

The 1982 EPA rule "Asbestos in Schools: Identification and Notification", 40 CFR 763, Subpart F, required analysis of bulk asbestos samples by PLM and provides a protocol for analysis in its Appendix A to Subpart F. EPA requires use of the same PLM method for this final rule. As it develops the accreditation process for laboratories performing analysis of bulk samples, NBS will consider whether to change the PLM protocol. If NBS recommends changes, EPA will amend this rule accordingly.

F. Assessment

Section 763.88 outlines a general assessment procedure to be conducted by an accredited inspector during each inspection or reinspection. The accredited inspector is required to classify ACBM and suspected ACBM assumed to be ACM in the school building into broad categories appropriate for response actions. In addition, after reviewing public comments, the Agency decided to require the inspector to give reasons in the written assessment supporting his classification decisions. Assessment may include a variety of considerations, including the location and amount of material, its condition, accessibility, potential for disturbance, known or suspected causes of damage, or preventive measures which might eliminate the reasonable likelihood of damage. The LEA is directed to select an accredited management plan developer who, after a review of the results of the inspection and the assessment, shall recommend in writing appropriate response actions.

G. Management Plans

Section 763.93 requires LEAs to develop an asbestos management plan for each school under its administrative control or direction. The plan must be developed by an accredited asbestos management planner. Some of the major components required in the plan include: A description of inspections and response actions; an assurance that accredited persons were used to conduct inspections, develop management plans, and design or conduct response actions; and a plan for reinspection, periodic surveillance, and operations and maintenance.

Each LEA is required to maintain a copy of the management plan in its administrative office, and each school is required to maintain a copy of the school's management plan in the school's administrative office. These plans are to be made available for inspection by the public without cost or restriction. LEAs must notify in writing, parent, teacher, and employee organizations of the availability of management plans upon submission of the plan to the State and at least once each school year. The requirement for written notification was added after the Agency reviewed comments from the public. In addition, based on public comments received on the proposed rule, the Agency has included in the final rule a requirement that in the absence of any such organizations, the LEA shall provide written notice to that group (e.g., parents) of the availability of the management plan.

Section 763.93 requires LEAs to submit their management plans to their States on or before October 12, 1988. Each LEA must begin implementation of its management plan on or before July 9, 1989, and complete implementation of the plan in a timely fashion.

H. Response Actions

The final rule identifies five major response actions—in § 763.91 operations and maintenance (O&M) and in § 763.90, repair, encapsulation, enclosure and removal—and describes appropriate conditions under which they may be selected by the LEA. The final rule also identifies the steps which shall be taken to properly conduct and complete the response actions.

The LEA is required to select and implement in a timely manner the appropriate response action. The response action selected shall be sufficient to protect human health and the environment. From among the response actions that protect human health and the environment, the LEA may select the response action that is least burdensome.

LEAs are required to use accredited persons to design or conduct response actions. Section 763.90 specifically provides that nothing in the rule shall be construed to prohibit the removal of ACBM from a school building at any time, should removal be the preferred response action of the LEA.

Different response actions are required for each of the five major categories of damaged or potentially damaged ACBM. These categories are:

1. Damaged or significantly damaged thermal system insulation ACM.
2. Damaged friable surfacing or miscellaneous ACM.
3. Significantly damaged friable surfacing or miscellaneous ACM.
4. Friable surfacing or miscellaneous ACM, and thermal system insulation ACM which has potential for significant damage; and
5. Friable surfacing or miscellaneous ACM, thermal system insulation ACM which has potential for damage.

In each of the categories above, procedures for appropriately controlling or abating the hazards posed by the ACBM are set forth. For damaged or significantly damaged thermal system insulation, the LEA must at least repair the damaged area. If it is not feasible, due to technological factors, to repair the damaged material, it must be removed. Further, the LEA must maintain all thermal system insulation in an intact state and undamaged condition. If damaged friable surfacing or miscellaneous ACM is present, the LEA shall encapsulate, enclose, remove, or repair the damaged area. After selecting the appropriate response actions that protect human health and the environment, the LEA may consider local circumstances, including occupancy and use patterns within the school building, and economic concerns, such as short- and long-term costs. When friable surfacing or miscellaneous ACBM is significantly damaged, the LEA must immediately isolate the functional space and then must remove the material in the functional space, unless enclosure or encapsulation would be sufficient to contain fibers.

Response actions for ACBM with potential for damage and potential for significant damage emphasize O&M and preventive measures to eliminate the reasonable likelihood that damage will occur. When potential damage is possible, the LEA must at least implement an O&M program. If there is potential for significant damage and preventive measures cannot be effectively implemented, response actions other than O&M or area isolation may be required.

Section 763.91 requires the LEA to implement an operations, maintenance and repair (O&M) program for any school building in which friable ACBM is present or assumed to be present in the building. Any material identified as nonfriable ACBM or nonfriable assumed ACBM which is rendered or is about to be rendered friable as a result of activities performed in the school building shall be treated as friable. For example, if nonfriable ACBM wallboard was about to be sanded, operations and maintenance procedures would be required. The O&M program, which must be documented in the LEA management plan, consists of worker protection (summarized in Unit II.K.), cleaning, operations and maintenance activities (also in Unit II.K.), and fiber release episodes.

An initial cleaning is required, which employs wet methods and is conducted at least once after completion of the inspection and before the initiation of a response action other than an O&M activity. In addition, the rule also requires that an accredited management planner make a written recommendation to the LEA regarding whether additional cleaning is needed. The recommendation on additional cleaning was added to the rule based on public comments.

The final rule requires that O&M activities (other than small-scale, short-duration activities) which disturb asbestos shall be designed and conducted by persons accredited to do such work. (A discussion of what constitutes small-scale, short-duration projects is given in Appendix B to Subpart E.) Finally, procedures are provided for responding to fiber release episodes—the uncontrolled or unintentional disturbance of ACBM. For minor episodes (i.e., those involving 3 square or linear feet or less of ACBM), basic cleaning and containment practices for O&M staff are listed. For larger amounts, accredited personnel are required to respond.

I. Training and Periodic Surveillance

The LEA shall ensure that all members of its maintenance and custodial staff receive at least 2 hours of awareness training. The LEA must also ensure that staff who conduct any activities which will disturb ACBM receive an additional 14 hours of training. Specific topics to be covered in the 2-hour and 14-hour training courses are listed in § 763.92(a).

Section 763.92(b) requires periodic surveillance to be performed at least once every 6 months. The LEA may use unaccredited personnel such as custodians or maintenance workers to conduct surveillance activities. Periodic surveillance requires checking known or assumed ACBM to determine if the ACBM's physical condition has changed since the last inspection or surveillance. The date of the surveillance and any changes in the condition of the ACBM must be added to the management plan.

J. Completion of Response Actions

After performing a thorough visual inspection, air testing is used to determine if a response action has been completed (§ 763.90(i)). Clearance air monitoring will not be required for small-scale, short-duration projects. Phase Contrast Microscopy (PCM) is allowed for response actions involving 260 linear or 160 square feet or less, the amounts used to trigger removal requirements under EPA's NESHAP (40 CFR Part 61, Subpart M).

Section 763.90 requires the use of transmission electron microscopy (TEM) for most removal, enclosure, and encapsulation response actions. Laboratories are to be accredited by the National Bureau of Standards (NBS). Until NBS develops its program, LEAs shall use laboratories that use the interim protocol described in Appendix A to this Subpart E. EPA continues to believe that TEM is the method of choice for air sample analysis because, unlike PCM, TEM analysis can distinguish asbestos from other fibers and detect the small thin fibers found at abatement sites. Therefore the use of TEM will significantly improve the adequacy of cleanup and is recommended over PCM when available. However, due to limited availability of microscopes for air sample analysis and the cost and time associated with TEM analysis, the final rule allows a phase-in period for the TEM requirement. For 2 years after the rule becomes effective, LEAs may choose to use PCM for response actions comprising 3,000 square or 1,000 linear feet or less. For 1 year after this, LEAs may use PCM for clearance of projects of 1,500 square or 500 linear feet or less. LEAs retain full discretion to require use of TEM at any time for any project.

The criterion for determining whether a response action is complete when using PCM will require multiple samples (minimum of five) with clearance allowed only if all of the individual samples are below the limit of reliable quantitation of the PCM method (0.01 fibers/cm^3). The rule requires persons to use the NIOSH 7400 method for PCM clearance.

The rule has a three-step process for using TEM to determine successful completion of a removal response action. The first step is a careful visual inspection, as mentioned above. The two steps that follow involve a sequential evaluation of the five samples taken inside the worksite and five samples taken outside the worksite. Both sets of samples must be taken at the same time to ensure that atmospheric conditions are the same and that the comparisons are valid. The inside samples are analyzed first. If the average concentration of the inside samples does not exceed the filter background contamination level (discussed in detail in Appendix A to Subpart E), then the removal is considered complete.

Step three is taken if the average concentration of the samples taken inside the worksite are greater than the filter background contamination level. In this case, an encapsulation, enclosure, or removal response action is considered complete when the average of five samples taken inside the worksite is not significantly larger than the average of five samples taken outside the worksite. A statistical comparison using the Z-Test must be used to determine whether the two averages are significantly different. (A discussion on how to compare measured levels of airborne asbestos with the Z-Test is given in Appendix A to Subpart E.) If the concentrations are not significantly different, then the response action is considered complete. If the inside average concentration is significantly higher, recleaning is required and new air samples must be collected and evaluated after the worksite has been cleaned and reinspected.

K. Use of Accredited Persons

Section 206 of Title II of TSCA requires accreditation of persons who:

1. Inspect for ACM in school buildings.
2. Prepare management plans for such schools.
3. Design or conduct response actions with respect to friable ACM in such schools (other than O&M activities).

Section 206 of Title II of TSCA required EPA to develop a Model Contractor Accreditation Plan by April 20, 1987. The Agency met this deadline and the model plan was published in the Federal Register of April 30, 1987 (52 FR 15875). The plan appears as Appendix C to Subpart E. A notice listing EPA approved courses appears elsewhere in this issue of the Federal Register.

Persons can receive accreditation from a State that has instituted an accreditation program at least as stringent as the requirements of the Model Plan. In addition, persons in States that have not yet developed programs at least as stringent as the Model Plan can receive accreditation by passing an EPA-approved training course and exam that are consistent with the Model Plan. The Model Plan requires persons seeking accreditation to take an initial course, pass an examination, and participate in continuing education.

L. Worker and Occupant Protection

Worker protection requirements for removal, encapsulation and/or enclosure response actions are already in effect under the EPA worker protection rule (40 CFR Part 763, Subpart G); and the OSHA construction standard (29 CFR 1926.58). EPA's NESHAP standard, although designed to protect outdoor air, also provides incidental protection to workers.

Essentially, under § 763.91, the regulation extends coverage of EPA's worker protection rule at 40 CFR 763.121 to maintenance and custodial personnel in schools who perform O&M activities but are not covered by OSHA's construction standard or an asbestos regulation under an OSHA approved State plan. The EPA worker protection rule itself extended the same protections as the OSHA construction standard to asbestos abatement workers who are employees of State and local governments and who are not otherwise covered by OSHA regulation or OSHA approved State plans. This final rule further extends these standards to O&M workers who are LEA employees. These regulations basically establish a Permissible Exposure Limit (PEL) of 0.2 fibers per cubic centimeter (f/cm^3) over an 8-hour period for abatement project workers exposed to airborne asbestos and an action level of 0.1 f/cm^3 which triggers a variety of worker protection practices. These practices include air monitoring, regulated work areas, engineering and work practice controls, respiratory protection and protective clothing, hygiene facilities and practices, worker training, medical surveillance, and recordkeeping requirements.

As an alternative, however, OSHA's standard allows employers to institute the provisions of its Appendix G in the case of small-scale, short-duration projects rather than comply with the full worker protection standard. Appendix B to Subpart E is an adaptation of OSHA's Appendix G and, thus, allows more flexibility in dealing with minor (small-scale, short-duration) projects.

None of the requirements of the OSHA standard or the EPA worker protection rule would apply if asbestos concentrations are below the action level (0.1 f/cm³). There are, however, fairly stringent requirements established by OSHA and adopted by EPA for purposes of this rule to show that levels are below this action level for any activity, including small-scale, short-duration projects. These requirements are discussed in the following paragraphs.

Employers who have a workplace or work operation covered by the EPA worker protection rule must perform initial monitoring to determine the airborne concentrations of asbestos to which employees may be exposed. If employers can demonstrate that employee exposures are below the action level (0.1 f/cm³) by means of objective data, then initial monitoring is not required. If initial monitoring indicates that employee exposures are below the PEL, then periodic monitoring is not required.

The exemption from monitoring in § 763.121(f)(2)(iii) of the worker protection rule for employers who have historical monitoring data is included in recognition of the fact that many employers have conducted or are currently conducting exposure monitoring. This exemption would prevent these employers from having to repeat monitoring activity for O&M activities that are substantially similar to previous jobs for which monitoring was conducted.

However, for purposes of this rule, EPA requires that such monitoring data must have been obtained from projects conducted by the employer that meet the following conditions:

1. The data upon which judgments are based are scientifically sound and collected using methods that are sufficiently accurate and precise.

2. The processes and work practices in use when the historical data were obtained are essentially the same as those to be used during the job for which initial monitoring will not be performed.

3. The characteristics of the ACM being handled when the historical data were obtained are the same as those on the job for which initial monitoring will not be performed.

4. Environmental conditions prevailing when the historical data were obtained are the same as for the job for which initial monitoring will not be performed.

When OSHA issued the final asbestos standard on June 20, 1986 (51 FR 22664), it published data from routine facility maintenance which "demonstrates a potential for exposure of maintenance personnel to concentrations exceeding 0.5 f/cm³ (fibers per cubic centimeter)." OSHA further stated:

> With the exception of wet handling, which is feasible in only very limited situations due to problems such as electrical wiring, and the use of HEPA vacuums for the clean-up of any debris generated during maintenance activities, OSHA believes that there do not appear to be any feasible engineering controls or work practices available to reduce these potential exposure to levels below the 0.2 f/cm³ PEL and that respirators will be required to comply with the 0.2 f/cm³ PEL.

LEAs are required, under the provisions of § 763.91 of this rule, to ascertain, through monitoring procedures or historic monitoring data, and to document that these levels have not been reached.

Under § 763.91, basic occupant protection requirements are established (regardless of air level) for any O&M activity in a school building which disturbs ACBM. Primarily, access must be restricted, signs posted, and air movement outside the area modified. Necessary work practices shall be implemented to contain fibers, the area shall be properly cleaned after the activity is completed, and asbestos debris must be disposed of in a proper manner.

Section 763.95 requires the LEA to attach warning labels immediately adjacent to any friable and nonfriable ACBM or suspected ACBM in routine maintenance areas, such as boiler rooms, until the material is removed. They shall read, in large size or bright colors, as follows: CAUTION: ASBESTOS. HAZARDOUS. DO NOT DISTURB WITHOUT PROPER TRAINING AND EQUIPMENT.

M. Waiver for State Programs

Section 763.98 provides a procedure to implement the statutory provision that a State can receive a waiver from some or all of the requirements of the final rule if the State has established and is implementing or intends to implement a program of asbestos inspection and management at least as stringent as the requirements of the final rule. The rule requests specific information to be included in the waiver request submitted to EPA, establishes a process for reviewing waiver requests, and sets forth procedures for oversight and rescission of waivers granted to States.

The final rule requires States seeking waivers to submit requests to the Regional Administrator for the EPA Region in which the State is located. Within 30 days of receiving a waiver request, EPA must determine whether the request is complete. Within 30 days after determining that a request is complete, EPA will issue in the Federal Register a notice that announces receipt of the request and solicit written comments from the public. Comments must be submitted within 60 days. If, during the comment period, EPA receives a written objection to the State's request or a written request for a public hearing, EPA will schedule a public hearing (as is required by TSCA Title II) to be held in the affected State after the close of the comment period. EPA will issue a notice in the Federal Register announcing its decision to grant or deny, in whole or in part, a request for waiver within 30 days after the close of the comment period or within 30 days following a public hearing.

N. Recordkeeping

Section 763.94 requires that LEAs collect and retain various records which are not part of the information submitted to the Governor in the management plan. Records required by the rule include those pertaining to certain events which occur after the submission of the management plan, including: Response actions and preventive measures; fiber release episodes; periodic surveillance; and various operations and maintenance activities. Records required must be maintained in a centralized location in the administrative office of the school and the local education agency.

For each homogeneous area where all ACBM has been removed, the LEA shall retain such records for 3 years after the next reinspection.

O. Enforcement

TSCA Title II, section 207(a) provides civil penalities of up to $5,000 per day for violations of Title II of TSCA when an LEA fails to conduct inspections in a manner consistent with the final rule, knowingly submits false information to the Governor, or fails to develop a management plan in a manner consistent with the final rule, knowingly submits false information to the Governor, or fails to develop a management plan in a manner consistent with this rule. TSCA Title II, section 16 provides civil penalties of up to $25,000 per day for violations of Title I of TSCA when a person other than an LEA violates the final rule. Criminal penalties may be assessed if any violation committed by any person (including a LEA) is knowing or willful.

The rule provides a process for filing complaints by citizens and requires that such complaints be investigated and responded to within a reasonable period of time consistent with the nature of the violation alleged.

P. Transport and Disposal

Section 203(h) of TSCA Title II requires EPA to promulgate regulations which prescribe standards for transportation and disposal of asbestos-containing waste material. The final rule on transport and disposal was to be issued by October 17, 1987, as part of the final regulations under TSCA Title II. EPA had planned to use revised NESHAP regulations on disposal of asbestos waste to satisfy the requirements of section 203(h) of Title II. However, completion of the NESHAP revision has been delayed.

Accordingly, under section 204(a) of Title II, LEAs shall carry out the requirements described in section 204(f). Section 204(f) states that "the local education agency shall provide for the transportation and disposal of asbestos in accordance with the most recent version of the Environmental Protection Agency's "Asbestos Waste Management Guidance" (or any successor to such document)." Under TSCA Title I, section 15(1)(D), as amended by AHERA section 3, EPA may enforce the provisions of section 204(f). The chapters of the waste management guidance document which pertain to transport and disposal have been printed in this **Federal Register** notice as Appendix D to Subpart E.

EPA intends to issue the revised asbestos NESHAP as a proposed rule under section 203(h) of TSCA Title II to govern transport and disposal of asbestos waste from schools. Section 204(f) will be in effect until a final rule under section 203(h) is promulgated. Further, EPA also intends that the NESHAP waste disposal rules will ultimately regulate asbestos emissions from waste disposal when they are promulgated.

III. Response to Public Comments

This unit discusses EPA's responses to the most significant issues raised in the comments received from the public. A more comprehensive version of EPA's response to comments received has been placed in the public record.

Comments and responses are organized in this unit according to the relevant section of the regulation.

A. Scope and Purpose

Comments were received regarding three aspects of the Scope and Purpose section (§ 763.80). Comments from a group of technical practitioners, which included architects, engineers, and consultants involved in asbestos control, suggested that preschool nurseries, colleges, and universities should be included in the schools covered by the regulation. A second issue raised in the comments recommended that nonfriable materials not be subject to the inspection and management plan requirements of the regulation. Third, many commenters expressed concerns that the October 12, 1988, deadline for submitting management plans to States could not be met.

On all three of these issues, the statutory language of Title II is clear and the regulation reflects the statute. Title II only gives EPA authority to regulate "local education agencies." The definition of "local education agency" in section 202(7) refers only to public and private elementary and secondary schools. Section 203 of Title II requires inspection for "asbestos-containing materials" which includes both friable and nonfriable asbestos (see section 202). Management plan provisions of Title II also refer to "asbestos-containing material." Finally, section 205(a) of Title II specifies that "720 days after enactment" of this title (i.e., October 12, 1988) local education agencies must submit management plans to the Governors of their States. Based on the comments received, EPA is concerned about the ability of LEAs to complete and submit management plans by October 12, 1988. The deadline, however, is prescribed in the statute.

B. Definitions

1. *Asbestos containing building material.* In general, union groups and education groups urged the incorporation into the rule of all exterior ACM and other asbestos material such as asbestos gloves. Conversely, several school administration groups argued to limit the rule to interior areas only and not to include asbestos gloves and other such materials within the scope of the rule.

TSCA Title II was designed to provide school children and school employees with a safe environment while attending classes or working inside school buildings. The statute in several places specifically authorizes EPA to regulate asbestos "in" school buildings. Furthermore, an extension to all exterior areas would result in only small health benefits since most exterior ACM is enclosed in solid matrices such as cement, is nonfriable, and is not generally disturbed. Dealing with exterior materials would constitute an expensive undertaking for schools in terms of inspection and management plan development for such small health benefits. The Agency believes the proposed rule's coverage of all interior areas and a few specified exterior areas that function similar to interior areas protects the health of building occupants.

EPA also interprets TSCA Title II as not including nonbuilding asbestos products within the scope of the rule. The definition of friable ACM in the statute (section 202(6)) refers to ACM applied on ceilings, walls, structural members, piping, duct work, or any other part of a building. At no point does the statute cite as examples nonbuilding materials such as asbestos gloves. If certain schools such as vocational schools have other types of asbestos products in their buildings (e.g. automobile brake linings) they may want to voluntarily address these issues in a fashion similar to the AHERA requirements.

2. *Asbestos debris.* A number of commenters have sought to have dust included in the definition of asbestos debris. Some other commenters favor expanding the definition of asbestos debris to include dust in the immediate vicinity of friable ACM. Other commenters representing former asbestos manufacturers and schools argued that dust should not be included as part of the definitions of asbestos debris or as evidence of damage.

The Agency believes that an accredited expert be allowed to exercise judgment in determining whether asbestos fibers or dust constitute damage. EPA believes that accredited experts can determine whether dust has originated from adjacent ACBM. The Agency maintains, however, that not all dust in schools is ACM. An accredited person on-the-scene in a school building can make the determination of damage due to the presence of dust based on training and experience. As a result, EPA has included in the final rule's definitions of asbestos debris the flexibility for the accredited inspectors to determine dust to be asbestos containing.

3. *Significantly damaged friable surfacing and miscellaneous ACM.* Many commenters thought that significantly damaged asbestos should be defined to be damage that is either extensive "or" severe, rather than extensive "and" severe as in the proposal. These commenters included education groups and unions. They believe that either condition can pose a significant health threat.

The Agency disagrees with the comments. Significantly damaged friable surfacing and miscellaneous ACM must refer to the most severely damaged areas where the damage is also widespread. Damage that is widespread or only severe is of concern, but should not necessarily require a response action of the same magnitude as those situations where both are present.

4. *Operations and maintenance.* Many commenters recommended that O&M apply to all ACBM, not just friable ACBM. Some of these commenters were primarily concerned with the need for periodic surveillance of all ACBM, not just friable ACBM as suggested by the proposed rule's definition.

The Agency disagrees with the recommendation to extend O&M to nonfriable ACBM. Section 203(f) states that O&M is for friable ACBM. Periodic surveillance (see section 203(g) and training requirements (see generally section 206), however, apply to all ACM. The final rule makes clear these statutory distinctions. Section 763.91 dealing with O&M refers to friable asbestos and § 763.92 dealing with periodic surveillance and training apply to all ACM (including friable and nonfriable materials).

5. *Potential damage and potential significant damage.* Many groups commented on these definitions. A group representing former asbestos manufacturers argue that the best indicator of potential damage is evidence of past damage. Some union groups and State attorneys general commented that in addition to accessibility, potential significant damage ought to include air erosion and vibration as disturbance factors.

The Agency believes adding the terms air erosion and vibration increases the specificity of the rule and clarifies the original intent of the proposed regulation. As a result, the Agency accepts the comments regarding air erosion and vibration and has added definitions for each of these terms. EPA believes that whether past damage is the best indicator of potential damage is irrelevant to defining potential damage. As asbestos material ages, it may become more susceptible to damage. The Agency, accordingly, believes that all circumstances must be considered in assessing potential damage.

6. *Repair and enclosure.* A sizable number of commenters suggested that EPA change the wording of both of these definitions to require the preventing of fiber release. In the proposed rule, repair "contained" fiber release and enclosure "controlled" fiber release. In addition, another commenter suggested adding the requirements of inaccessibility and permanence for enclosed ACM. One commenter wanted to expand the enclosure definition to account for spray applied enclosures.

EPA agrees with the recommendation regarding fiber release. Preventing fiber release clarifies the intent of the repair definition. An enclosure is an airtight, impermeable, permanent barrier and as such must by definition prevent the release of fibers.

7. *Vibration and air erosion.* Several commenters suggested these terms be defined in the rule.

EPA agrees with the commenters and has added definitions for both terms.

C. LEA Responsibilities

Several issues in this section were commented upon by LEAs, education associations, school administrators and school board groups and state government officials.

Comments were received on the requirement in the proposed rule for the LEA to designate a person to ensure that the requirements of this section are properly implemented. Some commenters felt that this requirement was unnecessary while other commenters felt that the requirement of the proposed rule was sufficiently flexible to allow for differences in size and capabilities of LEAs. Some commenters favored appointment of an asbestos program manager with more stringent training or qualification requirements for that person. EPA has retained for the final rule the requirement for a designee to ensure proper implementation of LEA responsibilities. This approach provides the benefits of having a single overseer for the asbestos program without the added burden of more stringent training or qualification requirements.

Many parties commented on the requirement that LEAs ensure that short-term workers (telephone repair workers, administrators, etc.) who may come in contact with asbestos are "instructed in safe work practices" regarding ACM. Commenters felt that this placed an undue burden on LEAs and that the responsibility for this kind of instruction for short-term workers rests with their employer. EPA agrees with these comments and has eliminated this requirement while retaining the provision that LEAs ensure that short-term workers are provided information about the locations of ACBM.

The potential for conflicts of interest between accredited inspectors, management planners, and persons who design or conduct abatement actions also was discussed by a variety of commenters. Some commenters suggested that EPA should require the accredited persons to sign a conflict of interest statement certifying no party has a financial relationship with other parties involved in the inspection, development of the management plan, or performance of the response action. The Agency recommends that LEAs consider requesting a full financial disclosure from all potential accredited professions. It may be more efficient for LEAs to use the same firm to conduct the inspections and develop the management plans to promote continuity in the process. However, LEAs should be wary of employing one firm to develop both the management plan and conduct response actions, since the management planner's recommendations about response actions could be influenced by the potential profitability of the recommendation. A similar conflict of interest problem could exist when an abatement firm and an air monitoring firm are directly or indirectly connected. The air monitoring firm could conceivably provide false results that indicate a building is safe for reoccupancy and the abatement contractor has successfully completed the job. EPA has modified the LEA responsibilities section of the rule to specifically state that LEAs must consider conflict of interest issues. However, any resolution of such issues is solely at the discretion of the LEA.

D. Inspections and Reinspections

Comments received on this section dealt with three subjects: the scope of the inspection; the standardization of the inspection; and the inspection process itself.

Regarding the scope of the inspection comments were received on whether dormitories should be included in the inspection requirement. EPA concurs with the comments supporting the proposed rule's language including dormitories in the inspection. The Agency believes this is a reasonable extension of the definition of school building since the intent of AHERA is to protect children while attending school. Comments were also received regarding incorporation into the rule of all exterior ACM and other asbestos-containing products. As described in the "Definitions" part of this Unit, EPA believes these additions are unwarranted.

Comments were received regarding the use of a standardized inspection form, and commenters also urged EPA to issue a guidance document for inspectors and management planners. EPA disagrees with comments supporting a mandatory inspection form. The Agency believes LEAs, accredited inspectors, and States should be allowed the flexibility to develop inspection forms to suit their needs. However, EPA is developing a guidance document for LEAs which explains the requirements of this rule, and that document will contain, among other things, a suggested format for inspection and management plans. In addition, EPA has developed a model course for accreditation of inspectors and management planners which will provide uniform guidance to inspectors and management planners regarding their responsibilities. Further, before any course is offered to accredit inspectors and management planners, it must be reviewed and approved by EPA in accordance with the provisions of the Model Accreditation Plan. This review process will help ensure that inspectors and management planners receive uniform guidance.

The Agency received comments about the requirement for reinspection every 3 years by an accredited inspector. Some commenters supported this requirement, others thought the reinspection should be more frequent, still others felt that the reinspection should be less frequent and that use of an accredited inspector was unnecessary. EPA believes a 3-year reinspection requirement to be conducted by an accredited inspector is necessary. The Agency is concerned that an annual reinspection as suggested by some commenters would prove unduly burdensome to LEAs while providing limited information. The rule provides for periodic surveillance activities at least twice a year to keep track of changes in the ACBM's condition. On the other hand, the Agency believes a reinspection every 5 years is too long a period of time for a school's ACBM not to be checked by an accredited inspector. ACBM could deteriorate substantially over a 5-year period of time. The Agency disagrees with comments suggesting that unaccredited persons should be permitted to perform reinspections. Accredited inspectors will have special training to determine changes in the physical condition of ACBM. The purpose of periodic surveillance, which may be conducted by unaccredited personnel, is to note observable changes in the condition of ACBM. For example, a periodic surveillance check would notice a water leak through an ACBM ceiling. The Agency believes the combination of the semiannual periodic surveillance check and the 3-year reinspection by an accredited inspector provides for adequate scrutiny of ACBM present in schools.

Industry commenters commended the proposed rule for allowing thermal system insulation "that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release" to be "deemed" nonfriable for the purposes of this regulation. Others commenters believed this is a misrepresentation of the true nature of the material, which is still friable under its covering.

The Agency agreed with comments that state friable thermal system insulation cannot properly be "deemed" nonfriable. This constitutes an inaccurate depiction of the true nature of this material. An undamaged jacket on thermal system insulation may be properly seen as an enclosure, which prevents fiber release and reduces hazard, but does not change the characteristics of material friability behind or under the enclosure.

However, while the Agency considers it inappropriate to "deem" or characterize friable thermal system insulation as nonfriable, it is appropriate to "treat" this material as nonfriable. EPA, in its guidance and technical assistance activities, has traditionally treated undamaged friable thermal system insulation as nonfriable, for the purposes of cleaning and other O&M activities.

Accordingly, the regulation at § 763.85(c) has been modified to state that thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as nonfriable.

Ultimately, however, the change in wording does not change the intent of the regulation that thermal insulation that has both an intact protective jacket and has retained structural integrity should be subject to periodic surveillance and preventive measures, and that custodial and maintenance workers must be trained to deal with such material. Furthermore, if the thermal insulation is disturbed or is about to be disturbed such that it would be rendered friable, all applicable O&M and response action provisions will apply. EPA believes that this is consistent with NESHAP, which considers such material to be friable when disturbed or removed.

E. Bulk Asbestos Sample Measurement

Comments suggested that EPA allow use of electron microscopy and X-ray diffraction (XRD) for the analysis of bulk samples.

For purposes of this rule, PLM will be used for analyzing bulk samples for asbestos. The analytical method to be employed is the EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (40 CFR 763, Appendix A to Subpart F). EPA feels that the existing EPA PLM protocol is technically sufficient for determining asbestos fiber identity and quantity. Currently, allowance is made in the EPA PLM protocol for additional determination of a fiber's quantity by XRD. Additionally, validated methods for the use of electron microscopy in bulk asbestos analysis do not exist at this time. New developments in electron microscopy or XRD technology may lead EPA to reconsider the use of these tools for primary analysis at a future time.

A number of comments sought clarification on the laboratory accreditation program. Two laboratory accreditation programs are currently being developed by the NBS for laboratories which analyze bulk and air samples for asbestos. The bulk accreditation program is expected to be operational in early FY89. The air accreditation program is expected to be complete in late FY89.

Until the NBS bulk accreditation program is complete, EPA will establish an interim accreditation program for laboratories which analyze bulk samples by PLM. EPA will provide interim accreditation to laboratories which correctly identify four samples as either asbestos-containing or nonasbestos-containing. EPA announced the availability of this program in the **Federal Register** of September 3, 1987 (52 FR 33470). The deadline for laboratory participation in the first round was September 30, 1987. A formal listing of the first round of accredited labs will be available in January 1988. Individual laboratories will be informed of their performance by letter in December 1987. Laboratories which did not participate in the first round of accreditation will be considered in the second round of accreditation, which is scheduled for April 1988.

F. Assessment

One comment regarding assessment of the physical condition of the material by accredited inspectors was that EPA should require accredited inspectors to give reasons for their assessment conclusions. EPA agrees with the comment. This requirement would provide reviewers of management plans at the State level with additional, useful information in judging whether the management plan accurately reflects the condition of the school building. The Agency believes the increase in the recordkeeping burden is small. As a result, § 763.88(b) has been changed to require the accredited inspector to give written reasons for the decision to classify ACBM.

Some commenters suggested that management planners should be required to use one assessment method in developing recommendations for LEAs about response actions. These commenters suggested a variety of algorithms and "decision tree" methods for consideration. Other commenters supported the proposed rule's language to allow various assessment methods. The Agency believes it is not possible to point to one assessment method as most capable of producing an appropriate response action recommendation: there are a number of suitable assessment methods available for use by accredited management planners. EPA's management planner accreditation course will provide instruction about a variety of such methods.

G. Response Actions

1. *Protection of human health and the environment in response action selection.* Several commenters, particularly several State attorneys general and unions, expressed concern that the structure of the response action subsection allowed costs and other considerations to be granted equal consideration with protecting human health and the environment.

EPA has clarified language in the response action subsection (§ 763.90) to underscore its original intent in the proposed rule that protecting human health and the environment is the prime consideration in selecting an appropriate response action. Comments from the Service Employees International Union were particularly useful in this regard.

The Agency believes its response action approach is consistent with congressional direction to apply the prior and inviolable standard of protecting human health and the environment, and allows the consideration and selection of the least burdensome method only after the overriding health determination is made.

2. *Air monitoring for determining response actions.* Several commenters, primarily from industry, encouraged the establishment of air monitoring standards as the primary basis for hazard assessment. Most commenters, however, supported EPA's position in the proposed rule.

Traditionally, EPA has recommended assessment of asbestos in schools by visual evaluation of qualitative factors such as the material's condition, physical characteristics, and location. A careful examination of physical characteristics of the material, conducted by a trained expert, provides a direct method for determining both the relative degree of hazard and the likelihood of future fiber release.

EPA continues to discourage the use of air monitoring as the primary technique for assessing asbestos hazards, since that method only measures current conditions and provides no information about potential and future levels of fiber release. Further, when the costs and technical requirements necessary for acquiring truly meaningful air monitoring data are considered, the Agency maintains that assessment of qualitative factors continues to be the appropriate method for assessment of hazards and selection of response actions which protect human health and the environment. However, air monitoring may provide useful supplemental information, when conducted in conjunction with a comprehensive visual inspection.

Several industry commenters proposed that EPA adopt air monitoring standards for damaged and significantly damaged ACM. The levels most often proposed were 0.01 fibers per cubic centimeter (f/cm^3) for damaged friable ACM; 0.1 f/cm^3 for significantly damaged friable ACM, with fibers longer than 5 um as measured by transmission electron microscopy (TEM) in each case. No commenters, however, provided any substantive rationale for choosing such levels. The Agency believes that such standards used for purposes of assessing asbestos hazards could not ensure protection of human health and the environment as intended by TSCA Title II. As factors to be used in determining whether response actions are necessary, these numerical values provide a false sense of precision regarding the presence and severity of asbestos hazards and the appropriateness of a given response action. For the same reasons cited in the above discussion of the use of air monitoring, the Agency disagrees with the suggestion that a numerical standard is appropriate as the primary criterion for selection of response actions.

3. *Specificity in definitions related to response actions.* Many commenters felt that more objective and definite response action descriptions should be provided by EPA with regard to damage-related definitions and response actions. Some believed that too much discretion was vested in accredited experts, who would be making technical judgments to advise LEA decisions. One comment cited EPA's economic impact analysis of the rule as an illustration of the lack of objectivity of the response action descriptions. In this analysis, EPA's own regional asbestos coordinators varied greatly in their estimates of what percentages of materials in schools in their regions fell into the various damage conditions described in TSCA Title II.

In response to comments, the Agency has added much more illustrative detail to three important definitions—damaged and significantly damaged friable thermal system insulation ACM; damaged friable miscellaneous ACM; and damaged friable surfacing ACM—which will help accredited experts better identify asbestos hazards in schools. EPA agrees that this language, taken from the preamble of the proposed rule, adds necessary clarification to conditions which may constitute ACM damage and warrant appropriate response actions. These descriptions were not available to Agency regional asbestos coordinators when they gave their estimates of damage in schools. In addition, the extensive training program developed in the rule should achieve much greater consistency in evaluating and assessing asbestos in schools, although perfect consistency will never be achieved.

However, a rigid response action decision structure is not appropriate for this rule, primarily because many asbestos hazard situations are too circumstantial and appropriate response actions are too "hazard specific" to fit neatly into a discrete set of prescriptive categories.

There appears, then, no substitute for the judgment of the accredited management planner, who must recommend appropriate response actions within the general requirements established in § 763.90. That section provides a process by which a range of available choices may be considered by the accredited expert and selected by the LEA to best protect human health and the environment from each particular asbestos hazard in the school.

Under the provisions of the regulation, LEAs may take into account a variety of particular considerations, such as local circumstances, technological feasibility of appropriate response actions, economic considerations, and other relevant factors in selecting the least burdensome method. Such factors, however, may be considered only after the response action has been determined to protect human health and the environment.

Finally, accreditation alone does not imply "expertness." It only assures a suitable and common level of competence and awareness which is necessary for inspection, assessment and response action recommendation. School officials are well-advised to consider a variety of factors, including quality of training, experience, and prior performance of accredited personnel in selecting inspectors, management plan developers, abatement project designers, and contractors for school asbestos projects.

4. *Removal as the "only" appropriate response action for significantly*

damaged ACM. Several State attorneys general, among several other commenters, contended that "[I]n cases of significant damage, the only appropriate response is to remove the material, as this is the only action which adequately protects human health and the environment."

EPA disagrees that removal is the only appropriate response in all cases of significantly damaged ACM, particularly thermal system insulation. There may indeed be particular circumstances of significant damage in which removal is both inappropriate and undesirable.

EPA agrees that, particularly with regard to significantly damaged friable miscellaneous and surfacing ACM, isolation of the functional space and removal is often the most appropriate (and possibly, only acceptable) response. Encapsulation, for example, would be an acceptable response action for friable surfacing ACM only under very limited circumstances, given current technology. However, the Agency will not categorically preclude response actions of repair, encapsulation, or enclosure which, under certain circumstances, may also protect human health and the environment.

5. *Implementation of response actions in a timely fashion.* Several commenters asked the Agency to clarify the requirement that appropriate response actions be selected and implemented by LEAs "in a timely fashion," perhaps by establishing time limits for particular actions.

Many of the response action provisions themselves imply timeliness in response. Damaged or significantly damaged thermal system insulation ACM or its covering, for example, must be constantly maintained in an intact state and undamaged condition. In addition, the rule specifies, in the case of significantly damaged friable surfacing or miscellaneous ACM, that LEAs must *immediately* isolate the functional space and restrict access, unless isolation is not necessary to protect human health and the environment.

The Agency does not believe it is able to define "timely fashion" or specify time limits or deadlines in applying such requirements in all cases any better than it is able to prescribe a single response action for every particular damage category. LEAs, in the context of particular asbestos hazards, in consultation with accredited experts and in full view of school-community groups, are responsible for determining appropriate schedules for their asbestos response actions.

However, LEAs should be advised that in providing "a schedule for beginning and completing each preventive measure and response action" as required in § 763.93(e)(6), the LEA is specifying what constitutes implementation of preventive measures and response actions in a timely fashion for that LEA. EPA and State enforcement officials will be monitoring LEA adherence to these schedules to determine whether enforcement actions are warranted against those schools which fail to meet their own deadlines for completing preventive measures and response actions.

6. *Repair for significantly damaged friable thermal system insulation ACM.* Several commenters, State attorneys general and the unions in particular, questioned the efficacy of repair for significantly damaged friable thermal system insulation ACM.

Repair is often successful in preventing fiber release from damaged thermal system insulation and, after assurance that it will protect human health and the environment, an LEA may find repair the least burdensome method of response. Techniques for thermal system insulation ACM repair are well-developed and easily accomplished. Furthermore, the nature of the material makes it especially susceptible to quick remediation with simple techniques.

EPA recognizes that severely damaged friable thermal system ACM may warrant removal to protect human health and the environment, but this is not always the case. If feasible, as determined by the accredited expert, and protective of human health and the environment, repair may be an appropriate response action for this level of damage under particular circumstances. Further, new and emerging repair technologies may offer LEAs new ways to prevent fiber release, protect human health and the environment, and postpone the major disruption often associated with asbestos removal projects until a more appropriate time.

Finally, "feasibility" does *not* imply, as one commenter feared, "repair first, and only if repair is impossible, then remove." There is no predisposition toward repair, but rather a prior consideration of repair feasibility as a check to avoid a major disruption to the material, through removal, if it is not necessary or desirable.

7. *Airborne asbestos fiber measurement for clearance of abatement sites.* EPA has received comments on the use of transmission electron microscopy (TEM), scanning electron microscopy, and phase contrast microscopy for the analysis of air samples taken for clearance air monitoring. Comments dealt with issues that included the possible uses of each of these analytical methods for clearance air monitoring, as well as issues specific to the use of TEM.

The final rule sets forth TEM as the analytical method to be used for analysis of samples taken for clearance air monitoring although the TEM requirement will be phased-in gradually. EPA convened a committee of leading microscopists from private and Federal laboratories to produce an analytical protocol specific for post-abatement clearance monitoring. Each microscopist had extensive experience in TEM, scanning electron microscopy (SEM), and airborne asbestos analysis. The unanimous conclusion of the microscopists was that, for purposes of clearance air monitoring, TEM was the technique of choice. Consequently, an interim TEM protocol has been formulated for clearance air monitoring of asbestos abatement sites in schools.

EPA chose to require analysis by TEM for four reasons: (1) TEM is capable of measuring the smallest diameter fibers; (2) based on existing, validated methods, a formal protocol has been developed; (3) TEM has been validated by intra- and inter-laboratory comparisons conducted by NBS; and (4) a formal laboratory accreditation program for TEM laboratories is currently under development by the NBS.

Phase Contrast Microscopy (PCM) will be allowed for clearance of small projects (removal of less than 160 ft^2 or 260 linear feet of asbestos) and during a phase-in of the TEM requirement, for clearance of some larger projects. This phase-in period will give laboratories a period of time to acquire and install TEM instruments, and will permit economical clearance of small projects where clearance analysis costs are a significant portion of total abatement costs.

PCM analysis must be made using the latest version of the NIOSH 7400 method. Two other methods of PCM analysis were considered: the OSHA/EPA Reference Method (ORM) and P&CAM 239. The ORM cannot be used for area clearance because it is intended for personal sampling of abatement workers during abatement work clearance following an abatement action. P&CAM 239 will not be allowed since both NIOSH and OSHA have determined that the NIOSH 7400 method is more accurate and reliable.

The PCM method is nonspecific for asbestos and it cannot detect the small thin fibers found at abatement sites. EPA research data has shown that PCM is often inadequate for post-abatement monitoring of airborne asbestos. These data indicate that sites which were shown to be clean with PCM data were found by TEM data to be still contaminated. Therefore, reoccupancy of sites initially cleared by PCM, and thus, assumed to have been adequately cleaned, may in fact result in exposures to asbestos.

SEM, for purposes of this rulemaking, was determined to be inadequate for building clearance for the following reasons: (1) Currently available methodologies are not validated for the analysis of asbestos fibers; (2) SEM is limited in its ability to identify the crystalline structure of a particular fiber. (SEM analysis is therefore confined to identification of structures by elemental composition and morphology); (3) recent studies conducted by NBS have evaluated several types of scanning electron microscopes and the variability between these instruments. (NBS has found the image contrast of the microscopes is difficult to standardize between individual scanning electron microscopes); and (4) currently no laboratory accreditation program exists for accrediting SEM laboratories. EPA is aware of two methodologies for SEM: a draft method currently in its initial review by the American Society for Testing and Materials (ASTM) and an Asbestos International Association (AIA) protocol. Neither method has been validated. Additionally, NBS has determined that the AIA method has inherent difficulty when examining certain types of asbestos.

Currently, a laboratory accreditation program is in development for TEM by NBS. Additionally, the AIHA PAT Program evaluates laboratories conducting PCM analyses. The NBS has unconditionally stated that it will not formulate a laboratory accreditation program for SEM based on existing methodologies. Until suitable methodologies are developed, EPA will continue to monitor and investigate the progress of SEM methodologies and research for asbestos analysis. New developments in SEM technology may allow SEM to be considered as an acceptable asbestos measurement tool in the future.

Regarding the use of TEM, several commenters suggested that the aspect ratio (length to width) should be extended to 10:1. For the purpose of TEM measurement by the methods in Appendix A, any elongated particle having a minimum length of 0.5 μm, parallel sides, and an aspect ratio (length to width) of 5:1 or larger is defined as a fiber. This represents a change in the previous EPA proposed TEM methodologies which examine fibers with aspect ratios of 3:1 and above; it follows the direction set by NIOSH in proposing modified counting rules in the 7400 method. It is consistent with the panel of microscopists' observations that asbestos structures have aspect ratios equal to and greater than 5:1 whereas the majority of nonasbestos structures, minerals and particles, for example, gypsum, have aspect ratios of less than 5:1. Analysis of these nonasbestos structures tends to comprise a large portion of the time required for sample analysis. EPA believes that further research is needed to justify the extension of aspect ratio to 10:1. Consequently, for the purpose of TEM building clearance, fibers must have an aspect ratio of at least 5:1.

8. *Phase-in period for TEM.* Several commenters asked that the phase-in period for requiring TEM analysis be lengthened, abbreviated, or eliminated altogether. EPA believes the 3-year phase-in period for requiring TEM for all but the smallest abatement jobs allows commercial laboratories the necessary time to purchase and set up additional TEM instruments. In December 1987, estimates developed by EPA's Office of Research and Development (ORD) indicated that there were approximately 62 commercial laboratories in the country which advertised the ability to perform TEM analysis on airborne asbestos samples. Testimony received during the August 25 and 26 public hearings for this rulemaking as well as information gathered by EPA staff, indicate that many laboratories intended to purchase additional TEM equipment. In addition, several laboratories own more than one transmission electron microscope.

EPA believes that an increased demand for TEM instruments will drive the supply of instruments, and has stipulated the 3-year phase-in to allow commercial laboratories time to react to the increased demand. The Agency believes a shorter phase-in period, or requiring the immediate use of TEM for all jobs would create a substantial burden on schools and laboratories. The delay to clear abatement jobs and the high cost associated with TEM analysis for relatively small jobs would be burdensome. EPA has consequently decided to retain the length and type of phase-in described in the proposed rule.

H. Operations and Maintenance and Worker Protection

1. *Worker protection and "small-scale-short-duration" activities.* Several commenters, particularly union groups, advised the Agency to increase worker protection standards and alter the definition and requirements for small-scale, short-duration projects (as defined by Appendix B to Subpart E) prescribed by the Occupational Safety and Health Administration's (OSHA's) and EPA's relevant worker protection regulations. In particular, comments focused on permissible exposure limits (PEL), the allowance of historical air monitoring data, respiratory protection, and the practice of glove bag removal. Other commenters recommended no change, citing OSHA's primacy in this area.

This final regulation, through the provisions of the EPA worker protection rule, extends coverage already in place for O&M workers in private schools under the OSHA construction standard to public sector O&M workers now unprotected in schools. This OSHA standard also includes Appendix B of this rule. LEAs may implement the provisions of Appendix B of the rule instead of the full scope of the EPA/OSHA worker protection regulation when they conduct small-scale, short-duration activities (all of which are presumed to exceed the action level of 0.1 f/cm ^{3}).

The Agency maintains that OSHA is the most appropriate Federal agency for determining worker protection policy. As noted in the preamble to the proposed rule, EPA believes that OSHA's recently completed worker protection rulemaking, a lengthy and detailed process focused specifically on such issues, is as appropriate to school O&M workers via the EPA worker protection rule as it is to other private sector O&M workers. EPA continues in this belief and no commenters have indicated substantive reasons why the OSHA protections should not be followed.

Therefore, the Agency does not intend to reassess the OSHA determination with respect to issues such as PEL, the use of historical air monitoring data, respiratory protection, and the allowance of glove bag removal. EPA will, however, change the provisions of its worker protection rule (and hence, this regulation) to conform with any modifications subsequently adopted by OSHA.

Finally, with regard to the definition of "small-scale, short-duration" activities, the Agency provides further clarification of the OSHA definition in Appendix B to Subpart E by adding five additional points which may be used to define such projects. EPA believes these additional considerations are instructive

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and useful, but will not require their consideration in defining "small-scale, short-duration" activities.

2. *Respiratory protection.* Many organizations, in their comments, advocated the mandatory use of respiratory protection for all operations and maintenance O&M work which might affect asbestos-containing materials ACM.

Once again, the Agency maintains that OSHA is the most appropriate Federal agency for determining worker protection regulations policy, including appropriate respiratory protection, and EPA finds that OSHA's respiratory protection regulations which govern O&M workers in the private sector are equally relevant in schools. EPA does not intend to reassess the OSHA determination in this regard.

However, the regulation does require specific respiratory protection training for all O&M workers who conduct any activities which will result in the disturbance of ACM. Such training must include: (1) Notification of information on the use of respiratory protection as contained in the EPA/National Institute for Occupational Safety and Health (NIOSH) "Guide to Respiratory Protection for the Asbestos Abatement Industry," September 1986 (EPA-560/OPTS-86-001); and (2) hands-on training in the use of respiratory protection.

EPA believes the effect of these training requirements will be to ensure that LEAs determine the appropriate level of protection for its O&M workers and that workers are adequately informed of protection levels and properly trained in respiratory protection practices.

Comments expressed concern that O&M workers could be at risk in situations where peak exposures occur and, thus, may need additional respiratory protection. The comments claim these exposures may exceed OSHA standards and are unpredictable. EPA, however, believes its regulations cover these situations since the regulations provide that respirators shall be supplied in areas where airborne concentrations "can reasonably be expected to exceed permissible limits" 40 CFR 763.121(e) (1) and (4). Since this regulation requires warning labels for asbestos materials (§ 763.95), workers and LEAs should be aware of situations in which asbestos materials will be disturbed to such an extent that respirators may be appropriate.

3. *Right to refuse work.* Several unions provided comments which advanced a proposal to include a right to refuse unsafe or illegal work in the regulation.

EPA believes that the issue of right to refuse work, which is protected under other labor legislation and worker protection regulations, is more properly addressed by the Department of Labor. This is a general worker protection issue, outside the scope of EPA's expertise. Comments noted that OSHA has promulgated a general regulation affecting an employee's right to refuse work (29 CFR 1977.12(b)(2)) and argue that EPA should extend this safeguard to school workers in the same way the Agency extended other OSHA safeguards to school workers. This point, however, is misplaced. EPA does not believe it should extend general OSHA safeguards to school workers. EPA is not charged with general worker protection, although it is appropriate to extend specific asbestos related standards to school workers.

AHERA section 211(a) does prohibit State or LEA discrimination in any way against someone because that person has provided information relating to a potention violation of the Act or regulation, including a school directive that workers perform unsafe or illegal activities. The Act allows for any employee or representative of employees who believes they have been fired or otherwise discriminated against to apply for review at the Department of Labor under section 11(c) of the Occupational Safety and Health Act.

4. *Routine cleaning.* Several commenters, particularly the State attorneys general and the unions, recommended that the Agency require routine or periodic cleaning in areas with friable ACM, as outlined in the EPA Purple Book.

The Agency has traditionally recommended, as a prudent measure, routine cleaning by wet methods in school areas with asbestos-containing materials, particularly when they are friable. Monthly wet cleaning has been recommended in previous EPA guidance for areas where friable surfacing ACM is present and semiannual wet cleaning is suggested in areas with damaged thermal system insulation ACM.

Other commenters stated the belief that improper cleaning on a regular basis might disturb the material and could actually increase fiber levels in the air. Further, periodic cleaning in limited-access areas, such as pipe tunnels, would not appreciably reduce exposure to school occupants and might actually increase hazard to custodial workers who conduct the cleaning.

EPA is persuaded by the comments that a decision on routine cleaning by the accredited management planner in the context of the particular asbestos hazard is appropriate. The final rule now requires that the accredited management planner shall make a written recommendation to the LEA regarding the appropriateness and frequency of additional cleaning, which must be included in the management plan.

I. Management Plans

The contents of the management plan were the subject of numerous comments from various parties. In general, commenters urged that the contents of the plan not exceed the items required in the statutory language of Title II. EPA believes that the language of Title II regarding management plans was made very prescriptive to enhance accountability, aid review by States, and improve enforcement of the regulation. The Agency has determined that the additional requirements in the regulation are consistent with the intent of the Act and that the additional information will be useful to parents, employees, accredited persons, State reviewers, and EPA enforcement officials.

The manner in which parents and employees should receive notification about the availability of asbestos management plans was the subject of many comments. In general, LEAs and school administrative groups favored the flexibility provided under the proposed rule, which allowed LEAs to notify parent and employee organizations without specifying the exact form of notification. Other commenters such as educational associations and environmental groups preferred written notification to individual parents and employees as a way of ensuring full awareness of the availability of the plan. EPA has modified this provision of the final rule to require written notification to parent and employee organizations, or, in the absence of such organizations, written public notice regarding plan availability. (Notification in the absence of the organizations could be in the form of a newspaper ad, an article in an LEA newsletter or various other forms.) The change provides a means of notification that should increase awareness of the plan, retain flexibility of LEAs regarding the exact form of the notification, and aid efforts to enforce the notification provisions.

Some commenters suggested that there is no need to notify parents of the availability of the plan. Title II, section 203(i)(5), states that the LEA "shall notify parent, teacher, and employee organizations of the availability of such plan."

Comments were also received regarding the need for an annual notification requirement even though the plan has not changed since the previous notification. The purpose for the annual notification is to ensure that parents and employees new to the LEA each year have an opportunity to be informed about the availability of the plan. Other commenters suggested that annual notification about the plan should include any asbestos abatement planned for that year, and that the notification requirement be expanded to inform parents whenever actions are taken under the management plans. EPA believes that these ends are achieved in a less burdensome fashion through § 763.84(c), which requires that the LEA inform workers and building occupants, or their legal guardians, at least once each school year about inspections, response actions, and post-response action activities, including periodic surveillance activities that are planned or in progress.

Regarding access to the plan, commenters suggested the plan required to be maintained at the individual school should not be the plan for the entire LEA, but only the plan for that school. The final rule has been clarified to specify that a school needs to have available only that part of the LEA's plan which pertains to that school. Another comment regarding access to the plan came from private school groups interested in limiting access to parents, students, and employees, thereby excluding the general public. EPA believes that this is contrary to Title II, section 203(i)(5), which states that the plan shall be available "for inspection by the public, including teachers, or other school personnel, and parents." Since persons involved with the school are only among those "included" in the public, EPA interprets the statute to preclude limiting access to all other members of the public.

J. State Waivers

Commenters suggested that the opportunity for a public hearing regarding a State's request for waiver should be granted upon request, rather than in response to a written request which details specific objections, as required in the proposal. EPA believes that by requiring a written statement, it is ensuring that hearings have been requested for a valid reason, thereby discouraging individuals from arbitrarily or capriciously requesting a hearing.

Comments were also received which suggested that documents submitted by States seeking waivers should be made public. State waiver requests will be made available as part of the public record required when EPA issues a notice in the Federal Register announcing receipt of the request and opportunity for public comment.

Commenters suggested that waiver requests from local governments should be permitted. Section 203(m) of Title II is clear in limiting waiver requests to States which have established and are implementing a program of asbestos inspection and management.

Commenters suggested that waivers should be granted to programs which are "substantially equivalent" to the regulation, rather than "at least as stringent." Section 203(m) of Title II clearly states that waivers are to be granted to programs "at least as stringent."

Commenters suggested that States with programs requiring only inspection of friable materials be allowed to seek waivers. The Agency believes that section 203(m) of Title II, which states that EPA "may waive some or all" of the regulatory requirements of Title II allows States which require inspection of friable materials in a manner at least as stringent as section 203 of Title II to be granted a waiver. The LEAs of that State would still be required to comply with the Title II requirements for inspection of nonfriable materials as well as all other Title II requirements for which the State did not have a program at least as stringent.

Other comments on the State waiver provisions will be considered as they are raised in proceedings affecting individual States.

K. Exclusions

Comments on the proposed exclusion criteria ranged from general support to opposing any exclusions. Some commenters indicated EPA's 1982 rule was frequently not complied with, dealt only with friable ACM, and the inspectors were not required to have accreditation. As a result, these commenters believe few if any exclusions could be granted based on the 1982 rule. Several commenters believe the term "substantial compliance" is vague and unenforceable. In addition, other commenters agreed that the requirement in the proposed rule to assess friable ACM would require inspectors to visually inspect all areas anyway. Lastly, some commenters suggested that requiring an accredited inspector to determine whether the LEA qualifies for an exclusion is too stringent and thus, unreasonable.

TCSA Title II directs the Agency to promulgate regulations which will provide for the exclusion of any area of a school building from the inspection requirements. If LEAs were required to repeat actions conducted properly in the past, the Agency would place an unnecessary burden on those LEAs and penalize LEAs which made a good faith effort to address asbestos hazards in their building. EPA believes a number of States and localities have developed inspection programs in recent years that are similar to Title II. In addition, LEAs that complied with EPA's 1982 rule could receive an exclusion from part of the final rule's requirements. For example, friable material sampled and found to contain asbestos on the ceiling of the cafeteria would not have to be re-sampled. Although friable ACBM must be assessed even if previously identified, the above example illustrates a savings to the LEA.

"Substantial compliance" allows previous sampling that was done in a random manner with sufficient samples to be adequate to determine no ACBM is present. EPA believes previous adequate inspection and sampling efforts conducted by LEAs should not prove worthless. For example, if a LEA had records that it took three random samples in a 1,500 square foot classroom to comply with EPA's 1982 rule or a State law, and all samples were analyzed negative for asbestos, an accredited inspector may determine that this is sufficient to indicate no asbestos is present even though the current rule would require five samples for the same classroom.

EPA believes only an accredited inspector has the training necessary to determine whether previous inspections and sampling were adequate. EPA has evidence to suggest that many inspections performed under the 1982 rule were conducted by persons with little or no inspection training. If these same individuals were responsible for determining the validity of previous inspections, large areas of schools may not be examined by accredited inspectors. In many respects, this would defeat the purpose of TSCA Title II.

L. Enforcement

Some commenters stated that the "Compliance and Enforcement" section of the proposed rule (§ 763.97) incorrectly describes the provisions of TSCA Title II and that the final rule should explicitly state the following points. First, LEAs that violate the regulations under Title II are not liable under any enforcement provision of Title I. Second, Title II does not allow EPA to assess penalties against individuals. Third, criminal penalties are not permitted for violation of Title II.

EPA disagrees. The provisions of the "Compliance and Enforcement" section

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are in accordance with applicable law, as discussed below.

Section 3 of AHERA, "Technical and Conforming Amendments," amends section 15(1) of TSCA Title I to provide that it is unlawful for any person to fail or refuse to comply with any requirement of TSCA Title II or any rule promulgated or order issued under Title II. Therefore, violations of Title II regulations, published in this document are generally subject to the civil and criminal penalties under section 16 of Title I and to civil injunctive actions under section 17 of Title I. This liability is qualified, however, by section 207 of Title II which describes LEA civil liabilities for violation of regulations and provides that LEAs are not liable for any civil penalty under Title I. Section 207, however, does not alter the criminal liabilities of Title I or the injunctive provisions of section 17 of Title I. Nor does section 207 provide any exemption from Title I provisions for inspectors, management planners or any other person other than an LEA that has responsibilities under TSCA Title II. Finally, regardless of the provisions of TSCA, applicable case law provides that liability for actions of organizations may extend to responsible officials.

Thus the three points noted in the comments are wrong. First, LEAs that violate Title II rules are liable for criminal penalties under section 16 of Title I and are subject to injunctive relief in Federal District Courts under section 17 of Title I. Second, individuals may be liable for violating TSCA Title II regulations. Individuals other than LEAs that violate Title II regulations are subject to any of the penalties under Title I, and responsible LEA officials may be liable for any LEA violation of Title II. Third, the effect of the conforming amendments to TSCA Title I is that criminal penalties may be assessed for violation or Title II.

M. Other Issues

1. *Cost estimates for inspection.* Several commenters, ranging from school districts to independent consultants, expressed concern that the economic impact analysis of the proposed rule underestimated the cost of inspecting for ACM. Comments claimed that labor rates and time required to conduct inspections were too low.

EPA agreed with these comments. As a result the Agency's estimates for the final rule increased due to an update of unit labor costs and a small increase in the time estimated to perform several inspection activities. As a result the estimated total cost for all inspection activities increased from the proposal to the final rule from approximately $58.2 million to approximately $78.5 million. The cost for the building walkthrough and visual inspection, assessment, and mapping and reporting activities increased, while the cost estimates for bulk sampling and analysis remained the same. The total inspection costs are now estimated to be $1,144 for public primary schools, $1,627 for public secondary schools and $1,587 for private schools.

2. *Cost estimates for management plans.* A number of commenters expressed concern that the proposed rule underestimated the cost of developing management plans due to low assumptions for labor rates and time needed to prepare the plan. EPA also received comments that training and recordkeeping costs were too low. These costs are considered by EPA as part of the cost of the management plan implementation. Several commenters also expressed concern that EPA underestimated the burden associated with the state review of management plans.

EPA agrees that labor costs and time needed to prepare plans were too low in the proposal and has increased these estimates. EPA has also increased the cost for training by raising labor rate estimates and including travel expenses in the cost of training. As a result, the average costs for first year development and implementation of a management plan for a typical school is estimated to be $3,270 for a public primary school, $4,521 for a public secondary school and $4,460 for a private school. The total cost for development and implementation of management plans increased from $970.8 million in the proposed rule to $1,272 million in the final rule.

With respect to the cost to States of reviewing management plans, EPA has not substantially changed its estimates. While the proposed rule stated a range of $63 to $95 for a State to review a plan, the final rule estimates this cost at approximately $77. The plan review burden will vary with the different number of schools found in each State. For example, California, with an estimated 10,932 schools, would incur a review cost of roughly $842,000. Delaware, with an estimated 288 schools, would incur a cost of about $23,000. States will incur this burden within the 90-day review period specified in the law. The burden for each State, if it must review many plans, may be substantial. However, this burden is imposed by statute.

3. *Costs for operations and maintenance (O&M) programs.* EPA received a comment that it should not have included a cost for levels of overhead and contingency costs for school O&M programs because schools are not run like a business and would not charge themselves overhead. In addition, the comment argued that EPA's assumed rate of three minor fiber release episodes per school per year was too high. It was also argued that EPA should not have included an opportunity cost associated with O&M work, since schools would not actually spend money on many O&M activities but would redirect their employees' activities. Finally, the commenter identified a mistake in the calculations of the cost of consumable supplies used in O&M programs.

EPA agrees that schools would not incur overhead and contingency costs for O&M work. EPA used these indirect costs to calculate the expenses associated with the incremental utility, payroll, and other expenses attributable to an O&M program. EPA believes that these estimates of indirect rates are reasonable.

EPA slightly modified its assumptions with respect to fiber release episodes. However, this change did not have a significant impact on the total cost of O&M programs.

With respect to using an opportunity cost approach in the calculation of O&M costs, EPA believes that these costs are, indeed, a real cost of conducting O&M. However, the Agency acknowledges that some portion of the O&M cost may not result in actual expenditures by a school if the school chooses to give up some other activity to absorb the additional O&M activity. Regardless of how the school chooses to react, these are costs imposed by the rule. Accordingly, the Agency has included the opportunity costs analysis in the final rule estimates.

EPA acknowledges its mistake in the cost of consumables and has adjusted the O&M costs accordingly. This yields a fairly substantial drop in per school annual expenses for O&M programs. The reason for the decrease in O&M costs noted below is almost entirely due to this decrease in cost of consumables.

The final rule's costs of O&M programs per school on a yearly basis (excluding the cost of special equipment acquisition) are now estimated to be $3,000 for a public primary school, $5,100 for a public secondary school and $3,800 for a private school. The total O&M costs have decreased from $525.4 million in the proposal to $292.7 million for the final rule.

4. *Costs for removal, enclosure and encapsulation projects.* Commenters argued that cost estimates in the

proposal for removal projects were incorrect because they assumed replacement costs and post-abatement air monitoring for asbestos materials removed during building demolition. These errors have been corrected in the final cost estimates.

In addition, EPA assumed in the proposal that all post-response action air samples would be analyzed using TEM. Since the rule allows limited PCM, the costs of response actions have decreased accordingly. This cost decrease is approximately $4,000 in direct expenses per project for those projects using PCM.

Total costs for removal, enclosure and encapsulation projects have decreased from $1,587.8 million in the proposal to $1,431 million in the final rule.

5. *Risk related to asbestos in buildings.* Comments argued that EPA did not adequately assess the evidence relating to the harm caused by asbestos in schools. Specifically, they claim that EPA's assessment of risk for this rule (1) did not consider estimates of the toxicological potency of asbestos developed by a number of scientists who disagree with the potency estimates accepted by the Agency; (2) ignored studies showing that prevailing exposure to asbestos in schools has often been measured at levels far below those assumed by the Agency in its assessment (70 to 500 ng/m ^{3}); and (3) did not consider documentation that asbestos exposures after major abatement, especially removal, may not be reduced at all and may even by elevated. Had such evidence been considered, according to one of these comments (Safe Buildings Alliance), EPA would have come to the conclusion that operations and maintenance programs are, in almost all schools, the appropriate response action to protect health and the environment. This evidence is cited to support the position that protection of health and the environment requires specification of an airborne exposure level of protection.

EPA disagrees that the evidence cited in these comments supports the need for an airborne asbestos standard in buildings. Rather, EPA believes that the data cited by these comments, even if assumed to be correctly interpreted by the commenters, supports the rule as promulgated.

The Agency has noted elsewhere in this preamble the problems with air monitoring as the primary assessment tool for asbestos in schools. Furthermore, no comments have provided any substantive health based justification for choosing any airborne level as an appropriate level to protect public health from asbestos in schools.

Nevertheless, EPA believes that the rule accomplishes the goals of these commenters to ensure that unnecessary removal activities do not occur. Indeed, one of these commenters (Safe Buildings Alliance) specifically stated that it believes removals could typically be the response action if the rules were *incorrectly* applied. The rules, however, are not designated to prefer one response action over another, but to allow schools the flexibility to deal with their particular situations. Certainly, asbestos in many schools may not present significant risks in its current condition, but could cause considerable harm if not dealt with properly. Also, there are plainly schools in which serious measures would be needed immediately. In this context the evidence cited by the comments is supportive of EPA's rule, as discussed below.

With respect to the potency of asbestos, EPA has decided that for purposes of this rule there is no need to resolve the divergence of opinion. See preamble to Proposed Rule, 52 FR 15833. In any event, EPA has considered differing views on asbestos health effects in other proceedings (see, e.g., 51 FR 3728 *et seq.*, January 29, 1986) and commenters have not presented new evidence. The important point for purposes of this rule, is that varying local circumstances will drive the decision on the appropriate response action.

With respect to asbestos exposure, EPA acknowledges that many building air measurements show low prevailing levels. However, peak levels during serious disturbances can be extremely high and may cause very serious risks to individuals involved. Regardless of the actual average measurements in all schools, regardless of whether one accepts the levels used by EPA in its assessment or the levels presented by the commenters, the basic structure of the rule should not be changed. Assessment of all the evidence leads to the conclusion that local educational agencies should at least adopt operations and maintenance programs and institute more serious response actions if local conditions warrant. The levels EPA used in its risk assessment are actual measurements (*see, e.g.* "Measuring Airborne Asbestos Levels in Buildings," EPA 560/13–80–026; "Airborne Asbestos Levels in Schools," EPA 560/5–83–003) and are reasonable for purposes of decisionmaking in the context of this rule. In any event, the lower airborne asbestos levels cited by the commenters do not make the case for an airborne regulatory level.

Finally, EPA interprets data on airborne levels of asbestos before and after removal actions differently from the commenters. The information available on airborne concentrations before and after asbestos removal is actually limited, dealing with a very small number of abatement actions. Nevertheless, EPA believes that this information indicates that, in the past, some abatement actions were not done properly and led to increased airborne levels. The rule, therefore, was designed to prevent shoddy abatement work. A draft report prepared by Batelle (March 1987) shows significant reduction in airborne asbestos concentrations in the enclosed abatement area in schools immediately after removal operations. Airborne levels measured in the Batelle study did increase back to approximately the same as pre-removal levels after school resumed (based on a statistical analysis of pre- and post-removal levels). However, these levels could only have been the result of reentrainment of asbestos from outside the immediate removal area. Removals, thus, were successful at the removal site but could not guarantee no fiber release from asbestos-containing materials remaining in the building. The Batelle draft, therefore, does not show an increase in exposure from the removal activities as suggested by the comments. At the very least, removal reduced some danger of peak exposures. The data in the Batelle draft may indicate a need for continuing O&M programs following abatement, particularly where all asbestos is not removed.

6. *Model accreditation plan.* EPA received comments about the provisions of the Model Accreditation Plan required under section 206 of TSCA Title II. Under Title II, the Agency was required to submit a final Model Accreditation Plan by April 20, 1987. The final plan was issued by EPA in accordance with that deadline. The final plan appeared in the Federal Register of April 30, 1987, entitled "Asbestos-Containing Material in Schools; Model Accreditation Plan."

IV. Economic Impact

The economic impact analysis estimates the incremental costs attributable to the proposed regulation, including costs of inspection, sampling, development, and implementation of management plans, training of school employees, periodic surveillance, and the implementation of abatement actions. Estimates of the number of schools affected and square footage of asbestos were developed based on the 1984 EPA survey of asbestos in schools

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and data compiled from the Asbestos School Hazard Abatement Act (ASHAA) loan and grant program. Estimates of the percentage of asbestos which falls into each of the hazard categories were based on the results of a survey of the EPA's Regional Asbestos Coordinators (RACs).

Using a model school/model project approach, costs of inspection, sampling, and appropriate response actions were developed for schools with ACM in each of the different hazard categories. For schools with only nonfriable ACM, the only costs estimated were for management plan implementation, nominal plan implementation activities, training of the asbestos program manager, custodial training for proper repair and maintenance of ACM, and the periodic surveillance and reinspection of ACM. For purposes of the economic analysis, EPA assumed that all schools with only nonfriable ACM would choose to forego sampling and instead just treat suspect material as asbestos-containing.

Asbestos abatement-related costs expected to be incurred regardless of the existence of these regulations were subtracted from the total costs to calculate only the incremental cost of the final regulations. For example, data from the ASHAA loan and grant application data base were used to project an average annual rate of removal of asbestos that is assumed would have occurred even if TSCA Title II legislation and these regulations were not promulgated. That average annual rate was estimated to be approximately 3.4 percent for primary schools, 3.3 percent for secondary schools, and 1.8 percent for private schools. The costs associated with this underlying rate of removal were subtracted from the total costs. Also, the costs of removal of friable ACM prior to demolition that is required by the NESHAPs regulations were also netted out of the total costs.

The estimated present value of the costs of these final regulations is approximately $3,145 million (using a 10 percent discount rate) over 30 years. This includes the cost of initial inspection and sampling—$78.5 million; development and implementation of management plans—$1,272 million; periodic surveillance—$47.7 million; reinspection—$23.2 million; special operations and maintenance programs—$292.7 million; and abatement response actions—$1,431 million.

The total number of primary and secondary schools potentially affected by these regulations is estimated to be 106,983. Approximately 44,600 are estimated to have about 213 million square feet of surfacing or thermal systems insulation ACM. Of these, an estimated 10,700 have surfacing ACM only. It is likely that every school contains some amount of nonfriable ACM such as floor tile, transite board, and fire doors.

The cost of an asbestos inspection is estimated to range from $1,144 to $1,627 per school for schools with both surfacing and thermal systems insulation ACM. This cost varies depending upon the size of the school, the amount and type of ACM contained in the school, and the type of professional doing the work. The costs of sampling and analysis if friable materials are found will depend upon the number of samples taken and analyzed. Costs of analysis are estimated to range from $25 to $47 per sample. Assuming the average school has to analyze 20 samples, the cost of analysis will be $500 to $940 per school. The cost of mapping ACM is estimated to range from $110 to over $270 per school.

The cost of developing a management plan if asbestos-containing surfacing ACM or thermal systems insulation ACM is present is estimated to range from $1,025 for an average-size public primary school to $1,420 for an average-size public secondary school. These estimates are weighted averages of the costs of plans developed by trained school personnel and by outside consultants. A less extensive management plan would be required for schools containing only nonfriable materials. The average development cost for a management plan where only nonfriable materials are present is estimated to be about $500 for both public primary and private schools, and about $715 for public secondary schools.

The cost of training for school employees involves a variety of factors ranging from course and accreditation exam fees to the possible expenses for any out of town travel required for the training. The estimated course fee for a 2-hour awareness session required of all school maintenance employees in schools with ACM is approximately $50 per person. The additional 14 hours of training for school maintenance workers who may come in contact with asbestos in doing minor repair and maintenance work that disturbs asbestos is estimated to cost $250. A fee of $420 is estimated for the 24 hours of training required for the certification of asbestos abatement workers doing more than just minor repair and small glove-bag removal jobs. The fee for the 40-hour training course and certification required for asbestos abatement contractors is estimated to be $640.

Response action costs depend primarily on the condition of the asbestos in a school and to a lesser extent on many other factors. In general, for surfacing ACM in all but the significantly damaged category, it is likely that the primary response action undertaken by a school will be special O&M activities. Use of O&M activities would likely continue until or unless the ACBM deteriorates to a "significantly damaged" condition. The annual cost of a special O&M program (excluding acquisition of special equipment) is estimated to range from $3,800 for a typical public primary school to $5,100 for a typical public secondary school. Initial cleaning costs are expected to range from $950 to $1,400.

The cost of removal depends upon many factors including size of the project. The estimated cost of removal for a 4,000 ft² project in which surfacing material is removed would be approximately $51,300. The cost of removal for a 900 ft² boiler wrap project is estimated to be approximately $30,900. The total discounted costs of response actions were estimated assuming schools undertake a combination of response actions that depend on the condition of the ACM.

V. Rulemaking Record

EPA has established a record for this rulemaking (docket control number OPTS-62048E). The record is available in the Office of Toxic Substances Public Information Office, from 8 a.m. to 4 p.m., Monday through Friday, except legal holidays. The Public Information Office is located in Rm. NE-G004, 401 M St., SW., Washington, DC.

The record includes information considered by EPA in developing the proposed and final rules. The record now includes the following categories of information:

1. Federal Register notices.
2. Support documents.
3. Reports.
4. Memoranda and letters.
5. Records of the negotiating committee.
6. Public comments received on the proposed rule.
7. Response to comments document.
8. Transcript of the August 25 and 26 Public Meeting.

EPA requests that any person who commented on this rule submit to the Agency in writing any information which such person believes shows there are errors or omissions in the record. EPA will evaluate such submissions and supplement the record as appropriate.

VI. References

1. USEPA. "Guidance for Controlling Asbestos-Containing Materials in Buildings." EPA 560/5–85–024, June 1985.

2. USEPA. "A Guide to Respiratory Protection for the Asbestos Abatement Industry." EPA 560/OPTS–86–001, September 1986.

3. USEPA. "Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials," EPA 560/5–85–030a. October 1985.

4. USEPA. Friable Asbestos-Containing Materials in Schools, 40 CFR Part 763, Subpart F.

5. USEPA. National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61, Subpart M.

6. USDOL. OSHA. Occupational Exposure to Asbestos, 29 CFR 1926.58.

7. USEPA. Toxic Substances; Asbestos Abatement Projects, 40 CFR Part 763, Subpart G.

VII. Regulatory Assessment Requirements

A. Executive Order 12291

Under Executive Order 12291, EPA has determined that this rule is a "major" rule and has developed a Regulatory Impact Analysis. EPA has prepared an economic impact analysis of the TSCA Title II regulations.

B. Regulatory Flexibility Act

EPA has analyzed the economic impact of this rule on small businesses. EPA's analysis of the economic consequences of this rule appears in Unit IV.

C. Paperwork Reduction Act

The reporting and recordkeeping provisions in this rule have been approved by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, and has been assigned OMB control number 2070–0091.

List of Subjects in 40 CFR Part 763

Asbestos, Environmental protection, Hazardous substances, Incorporation by reference, Occupational health and safety, Recordkeeping, Schools.

Dated: October 17, 1987.

Lee M. Thomas,
Administrator.

Therefore, 40 CFR Part 763 is amended as follows:

PART 763—[AMENDED]

1. The authority citation for Part 763 continues to read as follows:

Authority: 15 U.S.C. 2605 and 2607(c). Subpart E also issued under 15 U.S.C. 2641, 2643, 2646, and 2647.

2. By adding §§ 763.80 through 763.99 and Appendices A, B, and D to Subpart E to read as follows:

Subpart E—Asbestos-Containing Materials in Schools

Sec.
763.80 Scope and purpose.
763.83 Definitions.
763.84 General local education agency responsibilities.
763.85 Inspection and reinspections.
763.86 Sampling.
763.87 Analysis.
763.88 Assessment.
763.90 Response actions.
763.91 Operations and maintenance.
763.92 Training and periodic surveillance.
763.93 Management plans.
763.94 Recordkeeping.
763.95 Warning labels.
763.97 Compliance and enforcement.
763.98 Waiver; delegation to State.
763.99 Exclusions.
Appendix A to Subpart E—Interim Transmission Electron Microscopy Analytical Methods—Mandatory and Nonmandatory—and Mandatory Section to Determine Completion of Response Actions
Appendix B to Subpart E—Work Practices and Engineering Controls for Small-Scale, Short-Duration Operations Maintenance and Repair (O&M) Activities Involving ACM

* * * * *

Appendix D to Subpart E—Transport and Disposal of Asbestos Waste

§ 763.80 Scope and purpose.

(a) This rule requires local education agencies to identify friable and nonfriable asbestos-containing material (ACM) in public and private elementary and secondary schools by visually inspecting school buildings for such materials, sampling such materials if they are not assumed to be ACM, and having samples analyzed by appropriate techniques referred to in this rule. The rule requires local education agencies to submit management plans to the Governor of their State by October 12, 1988, begin to implement the plans by July 9, 1989, and complete implementation of the plans in a timely fashion. In addition, local education agencies are required to use persons who have been accredited to conduct inspections, reinspections, develop management plans, or perform response actions. The rule also includes recordkeeping requirements. Local education agencies may contractually delegate their duties under this rule, but they remain responsible for the proper performance of those duties. Local education agencies are encouraged to consult with EPA Regional Asbestos Coordinators, or if applicable, a State's lead agency designated by the State Governor, for assistance in complying with this rule.

(b) Local education agencies must provide for the transportation and disposal of asbestos in accordance with EPA's "Asbestos Waste Management Guidance." For convenience, applicable sections of this guidance are reprinted as Appendix D of this subpart. There are regulations in place, however, that affect transportation and disposal of asbestos waste generated by this rule. The transportation of asbestos waste is covered by the Department of Transportation (49 CFR Part 173, Subpart J) and disposal is covered by the National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Part 61, Subpart M).

§ 763.83 Definitions.

For purposes of this subpart:

"Act" means the Toxic Substances Control Act (TSCA), 15 U.S.C. 2601, *et seq.*

"Accessible" when referring to ACM means that the material is subject to disturbance by school building occupants or custodial or maintenance personnel in the course of their normal activities.

"Accredited" or "accreditation" when referring to a person or laboratory means that such person or laboratory is accredited in accordance with section 206 of Title II of the Act.

"Air erosion" means the passage of air over friable ACBM which may result in the release of asbestos fibers.

"Asbestos" means the asbestiform varieties of: Chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonitegrunerite); anthophyllite; tremolite; and actinolite.

"Asbestos-containing material" (ACM) when referring to school buildings means any material or product which contains more than 1 percent asbestos.

"Asbestos-containing building material" (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building.

"Asbestos debris" means pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.

"Damaged friable miscellaneous ACM" means friable miscellaneous ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or, if applicable, which has delaminated such that its bond to the substrate (adhesion) is inadequate or which for any other reason lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

"Damaged friable surfacing ACM" means friable surfacing ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or which has delaminated such that its bond to the substrate (adhesion) is inadequate, or which, for any other reason, lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

"Damaged or significantly damaged thermal system insulation ACM" means thermal system insulation ACM on pipes, boilers, tanks, ducts, and other thermal system insulation equipment where the insulation has lost its structural integrity, or its covering, in whole or in part, is crushed, water-stained, gouged, punctured, missing, or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges or other signs of physical injury to ACM; occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints. Asbestos debris originating from the ACBM in question may also indicate damage.

"Encapsulation" means the treatment of ACBM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers, as the encapsulant creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant).

"Enclosure" means an airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air.

"Fiber release episode" means any uncontrolled or unintentional disturbance of ACBM resulting in visible emission.

"Friable" when referring to material in a school building means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously nonfriable material after such previously nonfriable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

"Functional space" means a room, group of rooms, or homogeneous area (including crawl spaces or the space between a dropped ceiling and the floor or roof deck above), such as classroom(s), a cafeteria, gymnasium, hallway(s), designated by a person accredited to prepare management plans, design abatement projects, or conduct response actions.

"High-efficiency particulate air" (HEPA) refers to a filtering system capable of trapping and retaining at least 99.97 percent of all monodispersed particles 0.3 μm in diameter or larger.

"Homogeneous area" means an area of surfacing material, thermal system insulation material, or miscellaneous material that is uniform in color and texture.

"Local education agency" means:

(1) Any local educational agency as defined in section 198 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 3381).

(2) The owner of any nonpublic, nonprofit elementary, or secondary school building.

(3) The governing authority of any school operated under the defense dependents' education system provided for under the Defense Dependents' Education Act of 1978 (20 U.S.C. 921, et seq.).

"Miscellaneous ACM" means miscellaneous material that is ACM in a school building.

"Miscellaneous material" means interior building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and does not include surfacing material or thermal system insulation.

"Nonfriable" means material in a school building which when dry may not be crumbled, pulverized, or reduced to powder by hand pressure.

"Operations and maintenance program" means a program of work practices to maintain friable ACBM in good condition, ensure clean up of asbestos fibers previously released, and prevent further release by minimizing and controlling friable ACBM disturbance or damage.

"Potential damage" means circumstances in which:

(1) Friable ACBM is in an area regularly used by building occupants, including maintenance personnel, in the course of their normal activities.

(2) There are indications that there is a reasonable likelihood that the material or its covering will become damaged, deteriorated, or delaminated due to factors such as changes in building use, changes in operations and maintenance practices, changes in occupancy, or recurrent damage.

"Potential significant damage" means circumstances in which:

(1) Friable ACBM is in an area regularly used by building occupants, including maintenance personnel, in the course of their normal activities.

(2) There are indications that there is a reasonable likelihood that the material or its covering will become significantly damaged, deteriorated, or delaminated due to factors such as changes in building use, changes in operations and maintenance practices, changes in occupancy, or recurrent damage.

(3) The material is subject to major or continuing disturbance, due to factors including, but not limited to, accessibility or, under certain circumstances, vibration or air erosion.

"Preventive measures" means actions taken to reduce disturbance of ACBM or otherwise eliminate the reasonable likelihood of the material's becoming damaged or significantly damaged.

"Removal" means the taking out or the stripping of substantially all ACBM from a damaged area, a functional space, or a homogeneous area in a school building.

"Repair" means returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.

"Response action" means a method, including removal, encapsulation, enclosure, repair, operations and maintenance, that protects human health and the environment from friable ACBM.

"Routine maintenance area" means an area, such as a boiler room or mechanical room, that is not normally frequented by students and in which maintenance employees or contract workers regularly conduct maintenance activities.

"School" means any elementary or secondary school as defined in section 198 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 2854).

"School building" means:

(1) Any structure suitable for use as a classroom, including a school facility such as a laboratory, library, school eating facility, or facility used for the preparation of food.

(2) Any gymnasium or other facility which is specially designed for athletic

or recreational activities for an academic course in physical education.

(3) Any other facility used for the instruction or housing of students or for the administration of educational or research programs.

(4) Any maintenance, storage, or utility facility, including any hallway, essential to the operation of any facility described in this definition of "school building" under paragraphs (1), (2), or (3).

(5) Any portico or covered exterior hallway or walkway.

(6) Any exterior portion of a mechanical system used to condition interior space.

"Significantly damaged friable miscellaneous ACM" means damaged friable miscellaneous ACM where the damage is extensive and severe.

"Significantly damaged friable surfacing ACM" means damaged friable surfacing ACM in a functional space where the damage is extensive and severe.

"State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Northern Marianas, the Trust Territory of the Pacific Islands, and the Virgin Islands.

"Surfacing ACM" means surfacing material that is ACM.

"Surfacing material" means material in a school building that is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

"Thermal system insulation" means material in a school building applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

"Thermal system insulation ACM" means thermal system insulation that is ACM.

"Vibration" means the periodic motion of friable ACBM which may result in the release of asbestos fibers.

§ 763.84 General local education agency responsibilities.

Each local education agency shall:

(a) Ensure that the activities of any persons who perform inspections, reinspections, and periodic surveillance, develop and update management plans, and develop and implement response actions, including operations and maintenance, are carried out in accordance with Subpart E of this part.

(b) Ensure that all custodial and maintenance employees are properly trained as required by this Subpart E and other applicable Federal and/or State regulations (e.g., the Occupational Safety and Health Administration asbestos standard for construction, the EPA worker protection rule, or applicable State regulations).

(c) Ensure that workers and building occupants, or their legal guardians, are informed at least once each school year about inspections, response actions, and post-response action activities, including periodic reinspection and surveillance activities that are planned or in progress.

(d) Ensure that short-term workers (e.g., telephone repair workers, utility workers, or exterminators) who may come in contact with asbestos in a school are provided information regarding the locations of ACBM and suspected ACBM assumed to be ACM.

(e) Ensure that warning labels are posted in accordance with § 763.95.

(f) Ensure that management plans are available for inspection and notification of such availability has been provided as specified in the management plan under § 763.93(g).

(g)(1) Designate a person to ensure that requirements under this section are properly implemented.

(2) Ensure that the designated person receives adequate training to perform duties assigned under this section. Such training shall provide, as necessary, basic knowledge of:

(i) Health effects of asbestos.

(ii) Detection, identification, and assessment of ACM.

(iii) Options for controlling ACBM.

(iv) Asbestos management programs.

(v) Relevant Federal and State regulations concerning asbestos, including those in this Subpart E and those of the Occupational Safety and Health Administration, U.S. Department of Labor, the U.S. Department of Transportation and the U.S. Environmental Protection Agency.

(h) Consider whether any conflict of interest may arise from the interrelationship among accredited personnel and whether that should influence the selection of accredited personnel to perform activities under this subpart.

§ 763.85 Inspection and reinspections.

(a) *Inspection.* (1) Except as provided in paragraph (a)(2) of this section, before October 12, 1988, local education agencies shall inspect each school building that they lease, own, or otherwise use as a school building to identify all locations of friable and nonfriable ACBM.

(2) Any building leased or acquired on or after October 12, 1988, that is to be used as a school building shall be inspected as described under paragraphs (a) (3) and (4) of this section prior to use as a school building. In the event that emergency use of an uninspected building as a school building is necessitated, such buildings shall be inspected within 30 days after commencement of such use.

(3) Each inspection shall be made by an accredited inspector.

(4) For each area of a school building, except as excluded under § 763.99, each person performing an inspection shall:

(i) Visually inspect the area to identify the locations of all suspected ACBM.

(ii) Touch all suspected ACBM to determine whether they are friable.

(iii) Identify all homogeneous areas of friable suspected ACBM and all homogeneous areas of nonfriable suspected ACBM.

(iv) Assume that some or all of the homogeneous areas are ACM, and, for each homogeneous area that is not assumed to be ACM, collect and submit for analysis bulk samples under §§ 763.86 and 763.87.

(v) Assess, under § 763.88, friable material in areas where samples are collected, friable material in areas that are assumed to be ACBM, and friable ACBM identified during a previous inspection.

(vi) Record the following and submit to the person designated under § 763.84 a copy of such record for inclusion in the management plan within 30 days of the inspection:

(A) An inspection report with the date of the inspection signed by each accredited person making the inspection, State of accreditation, and if applicable, his or her accreditation number.

(B) An inventory of the locations of the homogeneous areas where samples are collected, exact location where each bulk sample is collected, dates that samples are collected, homogeneous areas where friable suspected ACBM is assumed to be ACM, and homogeneous areas where nonfriable suspected ACBM is assumed to be ACM.

(C) A description of the manner used to determine sampling locations, the name and signature of each accredited inspector who collected the samples, State of accreditation, and, if applicable, his or her accreditation number.

(D) A list of whether the homogeneous areas identified under paragraph (a)(4)(vi)(B) of this section are surfacing material, thermal system insulation, or miscellaneous material.

(E) Assessments made of friable material, the name and signature of each accredited inspector making the assessment, State of accreditation, and if applicable, his or her accreditation number.

[illegible]) *Reinspection.* (1) At least once every 3 years after a management plan is in effect, each local education agency shall conduct a reinspection of all friable and nonfriable known or assumed ACBM in each school building that they lease, own, or otherwise use as a school building.

(2) Each inspection shall be made by an accredited inspector.

(3) For each area of a school building, each person performing a reinspection shall:

(i) Visually reinspect, and reassess, under § 763.88, the condition of all friable known or assumed ACBM.

(ii) Visually inspect material that was previously considered nonfriable ACBM and touch the material to determine whether it has become friable since the last inspection or reinspection.

(iii) Identify any homogeneous areas with material that has become friable since the last inspection or reinspection.

(iv) For each homogeneous area of newly friable material that is already assumed to be ACBM, bulk samples may be collected and submitted for analysis in accordance with §§ 763.86 and 763.87.

(v) Assess, under § 763.88, the condition of the newly friable material in areas where samples are collected, and newly friable materials in areas that are assumed to be ACBM.

(vi) Reassess, under § 763.88, the condition of friable known or assumed ACBM previously identified.

(vii) Record the following and submit to the person designated under § 763.84 a copy of such record for inclusion in the management plan within 30 days of the reinspection:

(A) The date of the reinspection, the name and signature of the person making the reinspection, State of accreditation, and if applicable, his or her accreditation number, and any changes in the condition of known or assumed ACBM.

(B) The exact locations where samples are collected during the reinspection, a description of the manner used to determine sampling locations, the name and signature of each accredited inspector who collected the samples, State of accreditation, and, if applicable, his or her accreditation number.

(C) Any assessments or reassessments made of friable material, the name and signature of the accredited inspector making the assessments, State of accreditation, and if applicable, his or her accreditation number.

(c) *General.* Thermal system insulation that has retained its structural integrity and that has an undamaged protective jacket or wrap that prevents fiber release shall be treated as nonfriable and therefore is subject only to periodic surveillance and preventive measures as necessary.

§ 763.86 Sampling.

(a) *Surfacing material.* An accredited inspector shall collect, in a statistically random manner that is representative of the homogeneous area, bulk samples from each homogeneous area of friable surfacing material that is not assumed to be ACM, and shall collect the samples as follows:

(1) At least three bulk samples shall be collected from each homogeneous area that is 1,000 ft^2 or less, except as provided in § 763.87(c)(2).

(2) At least five bulk samples shall be collected from each homogeneous area that is greater than 1,000 ft^2 but less than or equal to 5,000 ft^2, except as provided in § 763.87(c)(2).

(3) At least seven bulk samples shall be collected from each homogeneous area that is greater than 5,000 ft^2, except as provided in § 763.87(c)(2).

(b) *Thermal system insulation.* (1) Except as provided in paragraphs (b) (2) through (4) of this section and § 763.87(c), an accredited inspector shall collect, in a randomly distributed manner, at least three bulk samples from each homogeneous area of thermal system insulation that is not assumed to be ACM.

(2) Collect at least one bulk sample from each homogeneous area of patched thermal system insulation that is not assumed to be ACM if the patched section is less than 6 linear or square feet.

(3) In a manner sufficient to determine whether the material is ACM or not ACM, collect bulk samples from each insulated mechanical system that is not assumed to be ACM where cement or plaster is used on fittings such as tees, elbows, or valves, except as provided under § 763.87(c)(2)..

(4) Bulk samples are not required to be collected from any homogeneous area where the accredited inspector has determined that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACBM.

(c) *Miscellaneous material.* In a manner sufficient to determine whether material is ACM or not ACM, an accredited inspector shall collect bulk samples from each homogeneous area of friable miscellaneous material that is not assumed to be ACM.

(d) *Nonfriable suspected ACBM.* If any homogeneous area of nonfriable suspected ACBM is not assumed to be ACM, then an accredited inspector shall collect, in a manner sufficient to determine whether the material is ACM or not ACM, bulk samples from the homogeneous area of nonfriable suspected ACBM that is not assumed to be ACM.

§ 763.87 Analysis.

(a) Local education agencies shall have bulk samples, collected under § 763.86 and submitted for analysis, analyzed for asbestos using laboratories accredited by the National Bureau of Standards (NBS). Local education agencies shall use laboratories which have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

(b) Bulk samples shall not be composited for analysis and shall be analyzed for asbestos content by PLM, using the "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" found at Appendix A to Subpart F in 40 CFR Part 763.

(c)(1) A homogeneous area is considered not to contain ACM only if the results of all samples required to be collected from the area show asbestos in amounts of 1 percent or less.

(2) A homogeneous area shall be determined to contain ACM based on a finding that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent.

(d) The name and address of each laboratory performing an analysis, the date of analysis, and the name and signature of the person performing the analysis shall be submitted to the person designated under § 763.84 for inclusion into the management plan within 30 days of the analysis.

§ 763.88 Assessment.

(a)(1) For each inspection and reinspection conducted under § 763.85 (a) and (c) and previous inspections specified under § 763.99, the local education agency shall have an accredited inspector provide a written assessment of all friable known or assumed ACBM in the school building.

(2) Each accredited inspector providing a written assessment shall sign and date the assessment, provide his or her State of accreditation, and if applicable, accreditation number, and submit a copy of the assessment to the person designated under § 763.84 for inclusion in the management plan within 30 days of the assessment.

(b) The inspector shall classify and give reasons in the written assessment for classifying the ACBM and suspected ACBM assumed to be ACM in the school building into one of the following categories:

(1) Damaged or significantly damaged thermal system insulation ACM.

(2) Damaged friable surfacing ACM.

(3) Significantly damaged friable surfacing ACM.

(4) Damaged or significantly damaged friable miscellaneous ACM.

(5) ACBM with potential for damage.

(6) ACBM with potential for significant damage.

(7) Any remaining friable ACBM or friable suspected ACBM.

(c) Assessment may include the following considerations:

(1) Location and the amount of the material, both in total quantity and as a percentage of the functional space.

(2) Condition of the material, specifying:

(i) Type of damage or significant damage (e.g., flaking, blistering, water damage, or other signs of physical damage).

(ii) Severity of damage (e.g., major flaking, severely torn jackets, as opposed to occasional flaking, minor tears to jackets).

(iii) Extent or spread of damage over large areas or large percentages of the homogeneous area.

(3) Whether the material is accessible.

(4) The material's potential for disturbance.

(5) Known or suspected causes of damage or significant damage (e.g., air erosion, vandalism, vibration, water).

(6) Preventive measures which might eliminate the reasonable likelihood of undamaged ACM from becoming significantly damaged.

(d) The local education agency shall select a person accredited to develop management plans to review the results of each inspection, reinspection, and assessment for the school building and to conduct any other necessary activities in order to recommend in writing to the local education agency appropriate response actions. The accredited person shall sign and date the recommendation, provide his or her State of accreditation, and, if applicable, provide his or her accreditation number, and submit a copy of the recommendation to the person designated under § 763.84 for inclusion in the management plan.

§ 763.90 Response actions.

(a) The local education agency shall select and implement in a timely manner the appropriate response actions in this section consistent with the assessment conducted in § 763.88. The response actions selected shall be sufficient to protect human health and the environment. The local education agency may then select, from the response actions which protect human health and the environment, that action which is the least burdensome method. Nothing in this section shall be construed to prohibit removal of ACBM from a school building at any time, should removal be the preferred response action of the local education agency.

(b) If damaged or significantly damaged thermal system insulation ACM is present in a building, the local education agency shall:

(1) At least repair the damaged area.

(2) Remove the damaged material if it is not feasible, due to technological factors, to repair the damage.

(3) Maintain all thermal system insulation ACM and its covering in an intact state and undamaged condition.

(c)(1) If damaged friable surfacing ACM or damaged friable miscellaneous ACM is present in a building, the local education agency shall select from among the following response actions: encapsulation, enclosure, removal, or repair of the damaged material.

(2) In selecting the response action from among those which meet the definitional standards in § 763.83, the local education agency shall determine which of these response actions protects human health and the environment. For purposes of determining which of these response actions are the least burdensome, the local education agency may then consider local circumstances, including occupancy and use patterns within the school building, and its economic concerns, including short- and long-term costs.

(d) If significantly damaged friable surfacing ACM or significantly damaged friable miscellaneous ACM is present in a building the local education agency shall:

(1) Immediately isolate the functional space and restrict access, unless isolation is not necessary to protect human health and the environment.

(2) Remove the material in the functional space or, depending upon whether enclosure or encapsulation would be sufficient to protect human health and the environment, enclose or encapsulate.

(e) If any friable surfacing ACM, thermal system insulation ACM, or friable miscellaneous ACM that has potential for damage is present in a building, the local education agency shall at least implement an operations and maintenance (O&M) program, as described under § 763.91.

(f) If any friable surfacing ACM, thermal system insulation ACM, or friable miscellaneous ACM that has potential for significant damage is present in a building, the local education agency shall:

(1) Implement an O&M program, as described under § 763.91.

(2) Institute preventive measures appropriate to eliminate the reasonable likelihood that the ACM or its covering will become significantly damaged, deteriorated, or delaminated.

(3) Remove the material as soon as possible if appropriate preventive measures cannot be effectively implemented, or unless other response actions are determined to protect human health and the environment. Immediately isolate the area and restrict access if necessary to avoid an imminent and substantial endangerment to human health or the environment.

(g) Response actions including removal, encapsulation, enclosure, or repair, other than small-scale, short-duration repairs, shall be designed and conducted by persons accredited to design and conduct response actions.

(h) The requirements of this Subpart E in no way supersede the worker protection and work practice requirements under 29 CFR 1926.58 (Occupational Safety and Health Administration (OSHA) asbestos worker protection standards for construction), 40 CFR Part 763, Subpart G (EPA asbestos worker protection standards for public employees), and 40 CFR Part 61, Subpart M (National Emission Standards for Hazardous Air Pollutants—Asbestos).

(i) Completion of response actions. (1) At the conclusion of any action to remove, encapsulate, or enclose ACBM or material assumed to be ACBM, a person designated by the local education agency shall visually inspect each functional space where such action was conducted to determine whether the action has been properly completed.

(2)(i) A person designated by the local education agency shall collect air samples using aggressive sampling as described in Appendix A to this Subpart E to monitor air for clearance after each removal, encapsulation, and enclosure project involving ACBM, except for projects that are of small-scale, short-duration.

(ii) Local education agencies shall have air samples collected under this section analyzed for asbestos using laboratories accredited by the National Bureau of Standards to conduct such analysis using transmission electron microscopy (TEM) or, under circumstances permitted in this section, laboratories enrolled in the American Industrial Hygiene Association Proficiency Analytical Testing Program for phase contrast microscopy (PCM).

(iii) Until the National Bureau of Standards TEM laboratory accreditation program is operational, local educational agencies shall use laboratories that use the protocol described in Appendix A to Subpart E of this part.

(3) Except as provided in paragraphs (i) (4), (5), (6), or (7) of this section, an action to remove, encapsulate, or enclose ACBM shall be considered complete when the average concentration of asbestos of five air samples collected within the affected functional space and analyzed by the TEM method in Appendix A of this Subpart E, is not statistically significantly different, as determined by the Z-test calculation found in Appendix A of this Subpart E, from the average asbestos concentration of five air samples collected at the same time outside the affected functional space and analyzed in the same manner, and the average asbestos concentration of the three field blanks described in Appendix A of this Subpart E is below the filter background level, as defined in Appendix A of this Subpart E, of 70 structures per square millimeter (70 s/mm ^{2}).

(4) An action may also be considered complete if the volume of air drawn for each of the five samples collected within the affected functional space is equal to or greater than 1,199 L of air for a 25 mm filter or equal to or greater than 2,799 L of air for a 37 mm filter, and the average concentration of asbestos as analyzed by the TEM method in Appendix A of this Subpart E, for the five air samples does not exceed the filter background level, as defined in Appendix A, of 70 structures per square millimeter (70 s/mm ^{2}). If the average concentration of asbestos of the five air samples within the affected functional space exceeds 70 s/mm ^{2}, or if the volume of air in each of the samples is less than 1,199 L of air for a 25 mm filter or less than 2,799 L of air for a 37 mm filter, the action shall be considered complete only when the requirements of paragraph (i) (3), (5), (6), or (7) of this section are met.

(5) At any time, a local education agency may analyze air monitoring samples collected for clearance purposes by phase contrast microscopy (PCM) to confirm completion of removal, encapsulation, or enclosure of ACBM that is greater than small-scale, short-duration and less than or equal to 160 square feet or 260 linear feet. The action shall be considered complete when the results of samples collected in the affected functional space and analyzed by phase contrast microscopy using the National Institute for Occupational Safety and Health (NIOSH) Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987, show that the concentration of fibers for each of the five samples is less than or equal to a limit of quantitation for PCM (0.01 fibers per cubic centimeter (0.01 f/cm ^{3}) of air). The method is available at the Office of the Federal Register Information Center, 11th and L St., NW., Room 8401, Washington, DC, 20408, and the EPA OPTS Reading Room, Rm. G004 Northeast Mall, 401 M St., SW., Washington, DC 20460. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. The method is incorporated as it exists on the effective date of this rule, and a notice of any change to the method will be published in the Federal Register.

(6) Until October 7, 1989, a local education agency may analyze air monitoring samples collected for clearance purposes by PCM to confirm completion of removal, encapsulation, or enclosure of ACBM that is less than or equal to 3,000 square feet or 1,000 linear feet. The action shall be considered complete when the results of samples collected in the affected functional space and analyzed by PCM using the NIOSH Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987, show that the concentration of fibers for each of the five samples is less than or equal to a limit quantitation for PCM (0.01 fibers per cubic centimeter, 0.01 f/cm ^{3}). The method is available at the Office of the Federal Register, 11th and L St., NW., Room 8301, Washington, DC, 20408, and in the EPA OPTS Reading Room, Rm. G004 Northeast Mall, 401 M St., SW., Washington, DC 20460. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. The method is incorporated as it exists on the effective date of this rule and a notice of any change to the method will be published in the Federal Register.

(7) From October 8, 1989, to October 7, 1990, a local education agency may analyze air monitoring samples collected for clearance purposes by PCM to confirm completion of removal, encapsulation, or enclosure of ACBM that is less than or equal to 1,500 square feet or 500 linear feet. The action shall be considered complete when the results of samples collected in the affected functional space and analyzed by PCM using the NIOSH Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987, show that the concentration of fibers for each of the five samples is less than or equal to a limit of quantitation for PCM (0.01 fibers per cubic centimeter, 0.01 f/cm ^{3}). The method is available at the Office of the Federal Register, 11th and L St., NW., Room 8301, Washington, DC, 20408, and in the EPA OPTS Reading Room, Rm. G004 Northeast Mall, 401 M St., SW., Washington, DC 20460. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51. The method is incorporated as it exists on the effective date of this rule and a notice of any change to the method will be published in the Federal Register.

(8) To determine the amount of ACBM affected under paragraphs (i) (5), (6), and (7) of this section, the local education agency shall add the total square or linear footage of ACBM within the containment barriers used to isolate the functional space for the action to remove, encapsulate, or enclose the ACBM. Contiguous portions of material subject to such action conducted concurrently or at approximately the same time within the same school building shall not be separated to qualify under paragraphs (i) (5), (6), or (7) of this section.

§ 763.91 Operations and maintenance.

(a) *Applicability.* The local education agency shall implement an operations, maintenance, and repair (O&M) program under this section whenever any friable ACBM is present or assumed to be present in a building that it leases, owns, or otherwise uses as a school building. Any material identified as nonfriable ACBM or nonfriable assumed ACBM must be treated as friable ACBM for purposes of this section when the material is about to become friable as a result of activities performed in the school building.

(b) *Worker protection.* The protection provided by EPA at 40 CFR 763.121 for worker protection during asbestos abatement projects is extended to employees of local education agencies who perform operations, maintenance, and repair (O&M) activities involving ACM and who are not covered by the OSHA asbestos construction standard at 29 CFR 1926.58 or an asbestos worker approved by OSHA under section 19 of the Occupational Safety and Health Act. Local education agencies may consult

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Appendix B of this Subpart if their employees are performing operations, maintenance, and repair activities that are of small-scale, short-duration.

(c) *Cleaning*—(1) *Initial cleaning.* Unless the building has been cleaned using equivalent methods within the previous 6 months, all areas of a school building where friable ACBM, damaged or significantly damaged thermal system insulation ACM, or friable suspected ACBM assumed to be ACM are present shall be cleaned at least once after the completion of the inspection required by § 763.85(a) and before the initiation of any response action, other than O&M activities or repair, according to the following procedures:

(i) HEPA-vacuum or steam-clean all carpets.

(ii) HEPA-vacuum or wet-clean all other floors and all other horizontal surfaces.

(iii) Dispose of all debris, filters, mopheads, and cloths in sealed, leak-tight containers.

(2) *Additional cleaning.* The accredited management planner shall make a written recommendation to the local education agency whether additional cleaning is needed, and if so, the methods and frequency of such cleaning.

(d) *Operations and maintenance activities.* The local education agency shall ensure that the procedures described below to protect building occupants shall be followed for any operations and maintenance activities disturbing friable ACBM:

(1) Restrict entry into the area by persons other than those necessary to perform the maintenance project, either by physically isolating the area or by scheduling.

(2) Post signs to prevent entry by unauthorized persons.

(3) Shut off or temporarily modify the air-handling system and restrict other sources of air movement.

(4) Use work practices or other controls, such as, wet methods, protective clothing, HEPA-vacuums, mini-enclosures, glove bags, as necessary to inhibit the spread of any released fibers.

(5) Clean all fixtures or other components in the immediate work area.

(6) Place the asbestos debris and other cleaning materials in a sealed, leak-tight container.

(e) *Maintenance activities other than small-scale, short-duration.* The response action for any maintenance activities disturbing friable ACBM, other than small-scale, short-duration maintenance activities, shall be designed by persons accredited to design response actions and conducted by persons accredited to conduct response actions.

(f) *Fiber release episodes*—(1) *Minor fiber release episode.* The local education agency shall ensure that the procedures described below are followed in the event of a minor fiber release episode (i.e., the falling or dislodging of 3 square or linear feet or less of friable ACBM):

(i) Thoroughly saturate the debris using wet methods.

(ii) Clean the area, as described in paragraph (e) of this section.

(iii) Place the asbestos debris in a sealed, leak-tight container.

(iv) Repair the area of damaged ACM with materials such as asbestos-free spackling, plaster, cement, or insulation, or seal with latex paint or an encapsulant, or immediately have the appropriate response action implemented as required by § 763.90.

(2) *Major fiber release episode.* The local education agency shall ensure that the procedures described below are followed in the event of a major fiber release episode (i.e., the falling or dislodging of more than 3 square or linear feet of friable ACBM):

(i) Restrict entry into the area and post signs to prevent entry into the area by persons other than those necessary to perform the response action.

(ii) Shut off or temporarily modify the air-handling system to prevent the distribution of fibers to other areas in the building.

(iii) The response action for any major fiber release episode must be designed by persons accredited to design response actions and conducted by persons accredited to conduct response actions.

§ 763.92 Training and periodic surveillance.

(a) *Training.* (1) The local education agency shall ensure, prior to the implementation of the O&M provisions of the management plan, that all members of its maintenance and custodial staff (custodians, electricians, heating/air conditioning engineers, plumbers, etc.) who may work in a building that contains ACBM receive awareness training of at least 2 hours, whether or not they are required to work with ACBM. New custodial and maintenance employees shall be trained within 60 days after commencement of employment. Training shall include, but not be limited to:

(i) Information regarding asbestos and its various uses and forms.

(ii) Information on the health effects associated with asbestos exposure.

(iii) Locations of ACBM identified throughout each school building in which they work.

(iv) Recognition of damage, deterioration, and delamination of ACBM.

(v) Name and telephone number of the person designated to carry out general local education agency responsibilities under § 763.84 and the availability and location of the management plan.

(2) The local education agency shall ensure that all members of its maintenance and custodial staff who conduct any activities that will result in the disturbance of ACBM shall receive training described in paragraph (a)(1) of this section and 14 hours of additional training. Additional training shall include, but not be limited to:

(i) Descriptions of the proper methods of handling ACBM.

(ii) Information on the use of respiratory protection as contained in the EPA/NIOSH *Guide to Respiratory Protection for the Asbestos Abatement Industry*, September 1986 (EPA 560/OPTS-86-001), available from TSCA Assistance Office (TS-799), Office of Toxic Substances, Environmental Protection Agency, Rm. E-543, 401 M St. SW., Washington, DC 20460, and other personal protection measures.

(iii) The provisions of this section and § 763.91, Appendices A, B, C, D of this Subpart E of this part, EPA regulations contained in 40 CFR Part 763, Subpart G, and in 40 CFR Part 61, Subpart M, and OSHA regulations contained in 29 CFR 1926.58.

(iv) Hands-on training in the use of respiratory protection, other personal protection measures, and good work practices.

(3) Local education agency maintenance and custodial staff who have attended EPA-approved asbestos training or received equivalent training for O&M and periodic surveillance activities involving asbestos shall be considered trained for the purposes of this section.

(b) *Periodic surveillance.* (1) At least once every 6 months after a management plan is in effect, each local education agency shall conduct periodic surveillance in each building that it leases, owns, or otherwise uses as a school building that contains ACBM or is assumed to contain ACBM.

(2) Each person performing periodic surveillance shall:

(i) Visually inspect all areas that are identified in the management plan as ACBM or assumed ACBM.

(ii) Record the date of the surveillance, his or her name, and any changes in the condition of the materials.

(iii) Submit to the person designated to carry out general local education agency responsibilities under § 763.84 a copy of such record for inclusion in the management plan.

§ 763.93 Management plans.

(a)(1) On or before October 12, 1988, each local education agency shall develop an asbestos management plan for each school, including all buildings that they lease, own, or otherwise use as school buildings, and submit the plan to an Agency designated by the Governor of the State in which the local education agency is located. The plan may be submitted in stages that cover a portion of the school buildings under the authority of the local education agency.

(2) If a building to be used as part of a school is leased or otherwise acquired after October 12, 1988, the local education agency shall include the new building in the management plan for the school prior to its use as a school building. The revised portions of the management plan shall be submitted to the Agency designated by the Governor.

(3) If a local education agency begins to use a building as a school after October 12, 1988, the local education agency shall submit a management plan for the school to the Agency designated by the Governor prior to its use as a school.

(b) On or before October 17, 1987, the Governor of each State shall notify local education agencies in the State regarding where to submit their management plans. States may establish administrative procedures for reviewing management plans. If the Governor does not disapprove a management plan within 90 days after receipt of the plan, the local education agency shall implement the plan.

(c) Each local education agency must begin implementation of its management plan on or before July 9, 1989, and complete implementation in a timely fashion.

(d) Each local education agency shall maintain and update its management plan to keep it current with ongoing operations and maintenance, periodic surveillance, inspection, reinspection, and response action activities. All provisions required to be included in the management plan under this section shall be retained as part of the management plan, as well as any information that has been revised to bring the plan up-to-date.

(e) The management plan shall be developed by an accredited management planner and shall include:

(1) A list of the name and address of each school building and whether the school building contains friable ACBM, nonfriable ACBM, and friable and nonfriable suspected ACBM assumed to be ACM.

(2) For each inspection conducted before the December 14, 1987:

(i) The date of the inspection.

(ii) A blueprint, diagram, or written description of each school building that identifies clearly each location and approximate square or linear footage of any homogeneous or sampling area where material was sampled for ACM, and, if possible, the exact locations where bulk samples were collected, and the dates of collection.

(iii) A copy of the analyses of any bulk samples, dates of analyses, and a copy of any other laboratory reports pertaining to the analyses.

(iv) A description of any response actions or preventive measures taken to reduce asbestos exposure, including if possible, the names and addresses of all contractors involved, start and completion dates of the work, and results of any air samples analyzed during and upon completion of the work.

(v) A description of assessments, required to be made under § 763.88, of material that was identified before December 14, 1987, as friable ACBM or friable suspected ACBM assumed to be ACM, and the name and signature, State of accreditation, and if applicable, accreditation number of each accredited person making the assessments.

(3) For each inspection and reinspection conducted under § 763.85:

(i) The date of the inspection or reinspection and the name and signature, State of accreditation and, if applicable, the accreditation number of each accredited inspector performing the inspection or reinspection.

(ii) A blueprint, diagram, or written description of each school building that identifies clearly each location and approximate square or linear footage of homogeneous areas where material was sampled for ACM, the exact location where each bulk sample was collected, date of collection, homogeneous areas where friable suspected ACBM is assumed to be ACM, and where nonfriable suspected ACBM is assumed to be ACM.

(iii) A description of the manner used to determine sampling locations, and the name and signature of each accredited inspector collecting samples, the State of accreditation, and if applicable, his or her accreditation number.

(iv) A copy of the analyses of any bulk samples collected and analyzed, the name and address of any laboratory that analyzed bulk samples, a statement that the laboratory meets the applicable requirements of § 763.87(a) the date of analysis, and the name and signature of the person performing the analysis.

(v) A description of assessments, required to be made under § 763.88, of all ACBM and suspected ACBM assumed to be ACM, and the name, signature, State of accreditation, and if applicable, accreditation number of each accredited person making the assessments.

(4) The name, address, and telephone number of the person designated under § 763.84 to ensure that the duties of the local education agency are carried out, and the course name, and dates and hours of training taken by that person to carry out the duties.

(5) The recommendations made to the local education agency regarding response actions, under § 763.88(d), the name, signature, State of accreditation of each person making the recommendations, and if applicable, his or her accreditation number.

(6) A detailed description of preventive measures and response actions to be taken, including methods to be used, for any friable ACBM, the locations where such measures and action will be taken, reasons for selecting the response action or preventive measure, and a schedule for beginning and completing each preventive measure and response action.

(7) With respect to the person or persons who inspected for ACBM and who will design or carry out response actions, except for operations and maintenance, with respect to the ACBM, one of the following statements:

(i) If the State has adopted a contractor accreditation program under section 206(b) of Title II of the Act, a statement that the person(s) is accredited under such plan.

(ii) A statement that the local education agency used (or will use) persons who have been accredited by another State which has adopted a contractor accreditation plan under section 206(b) of Title II of the Act or is accredited by an EPA-approved course under section 206(c) of Title II of the Act.

(8) A detailed description in the form of a blueprint, diagram, or in writing of any ACBM or suspected ACBM assumed to be ACM which remains in the school once response actions are undertaken pursuant to § 763.90. This description shall be updated as response actions are completed.

(9) A plan for reinspection under § 763.85, a plan for operations and maintenance activities under § 763.91,

and a plan for periodic surveillance under § 763.92, a description of the recommendation made by the management planner regarding additional cleaning under § 763.91(c)(2) as part of an operations and maintenance program, and the response of the local education agency to that recommendation.

(10) A description of steps taken to inform workers and building occupants, or their legal guardians, about inspections, reinspections, response actions, and post-response action activities, including periodic reinspection and surveillance activities that are planned or in progress.

(11) An evaluation of the resources needed to complete response actions successfully and carry out reinspection, operations and maintenance activities, periodic surveillance and training.

(12) With respect to each consultant who contributed to the management plan, the name of the consultant and one of the following statements:

(i) If the State has adopted a contractor accreditation plan under section 206(b) of Title II of the Act, a statement that the consultant is accredited under such plan.

(ii) A statement that the contractor is accredited by another State which has adopted a contractor accreditation plan under section 206(b) of Title II of the Act, or is accredited by an EPA-approved course developed under section 206(c) of Title II of the Act.

(f) A local education agency may require each management plan to contain a statement signed by an accredited management plan developer that such person has prepared or assisted in the preparation of such plan or has reviewed such plan, and that such plan is in compliance with this Subpart E. Such statement may not be signed by a person who, in addition to preparing or assisting in preparing the management plan, also implements (or will implement) the management plan.

(g)(1) Upon submission of a management plan to the Governor for review, a local education agency shall keep a copy of the plan in its administrative office. The management plans shall be available, without cost or restriction, for inspection by representatives of EPA and the State, the public, including teachers, other school personnel and their representatives, and parents. The local education agency may charge a reasonable cost to make copies of management plans.

(2) Each local education agency shall maintain in its administrative office a complete, updated copy of a management plan for each school under its administrative control or direction. The management plans shall be available, during normal business hours, without cost or restriction, for inspection by representatives of EPA and the State, the public, including teachers, other school personnel and their representatives, and parents. The local education agency may charge a reasonable cost to make copies of management plans.

(3) Each school shall maintain in its administrative office a complete, updated copy of the management plan for that school. Management plans shall be available for inspection, without cost or restriction, to workers before work begins in any area of a school building. The school shall make management plans available for inspection to representatives of EPA and the State, the public, including parents, teachers, and other school personnel and their representatives within 5 working days after receiving a request for inspection. The school may charge a reasonable cost to make copies of the management plan.

(4) Upon submission of its management plan to the Governor and at least once each school year, the local education agency shall notify in writing parent, teacher, and employee organizations of the availability of management plans and shall include in the management plan a description of the steps taken to notify such organizations, and a dated copy of the notification. In the absence of any such organizations for parents, teachers, or employees, the local education agency shall provide written notice to that relevant group of the availability of management plans and shall include in the management plan a description of the steps taken to notify such groups, and a dated copy of the notification.

(h) Records required under § 763.94 shall be made by local education agencies and maintained as part of the management plan.

(i) Each management plan must contain a true and correct statement, signed by the individual designated by the local education agency under § 763.84, which certifies that the general, local education agency responsibilities, as stipulated by § 763.84, have been met or will be met.

§ 763.94 Recordkeeping.

(a) Records required under this section shall be maintained in a centralized location in the administrative office of both the school and the local education agency as part of the management plan. For each homogeneous area where all ACBM has been removed, the local education agency shall ensure that such records are retained for 3 years after the next reinspection required under § 763.85(b)(1), or for an equivalent period.

(b) For each preventive measure and response action taken for friable and nonfriable ACBM and friable and nonfriable suspected ACBM assumed to be ACM, the local education agency shall provide:

(1) A detailed written description of the measure or action, including methods used, the location where the measure or action was taken, reasons for selecting the measure or action, start and completion dates of the work, names and addresses of all contractors involved, and if applicable, their State of accreditation, and accreditation numbers, and if ACBM is removed, the name and location of storage or disposal site of the ACM.

(2) The name and signature of any person collecting any air sample required to be collected at the completion of certain response actions specified by § 763.90(i), the locations where samples were collected, date of collection, the name and address of the laboratory analyzing the samples, the date of analysis, the results of the analysis, the method of analysis, the name and signature of the person performing the analysis, and a statement that the laboratory meets the applicable requirements of § 763.90(i)(2)(ii).

(c) For each person required to be trained under § 763.92(a) (1) and (2), the local education agency shall provide the person's name and job title, the date that training was completed by that person, the location of the training, and the number of hours completed in such training.

(d) For each time that periodic surveillance under § 763.92(b) is performed, the local education agency shall record the name of each person performing the surveillance, the date of the surveillance, and any changes in the conditions of the materials.

(e) For each time that cleaning under § 763.91(c) is performed, the local education agency shall record the name of each person performing the cleaning, the date of such cleaning, the locations cleaned, and the methods used to perform such cleaning.

(f) For each time that operations and maintenance activities under § 763.91(d) are performed, the local education agency shall record the name of each person performing the activity, the start and completion dates of the activity, the locations where such activity occurred, a description of the activity including preventive measures used, and if ACBM

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is removed, the name and location of storage or disposal site of the ACM.

(g) For each time that major asbestos activity under § 763.91(e) is performed, the local education agency shall provide the name and signature, State of accreditation, and if applicable, the accreditation number of each person performing the activity, the start and completion dates of the activity, the locations where such activity occurred, a description of the activity including preventive measures used, and if ACBM is removed, the name and location of storage or disposal site of the ACM.

(h) For each fiber release episode under § 763.91(f), the local education agency shall provide the date and location of the episode, the method of repair, preventive measures or response action taken, the name of each person performing the work, and if ACBM is removed, the name and location of storage or disposal site of the ACM.

(Approved by the Office of Management and Budget under control number 2070-0091)

§ 763.95 Warning labels.

(a) The local education agency shall attach a warning label immediately adjacent to any friable and nonfriable ACBM and suspected ACBM assumed to be ACM located in routine maintenance areas (such as boiler rooms) at each school building. This shall include:

(1) Friable ACBM that was responded to by a means other than removal.

(2) ACBM for which no response action was carried out.

(b) All labels shall be prominently displayed in readily visible locations and shall remain posted until the ACBM that is labeled is removed.

(c) The warning label shall read, in print which is readily visible because of large size or bright color, as follows: CAUTION: ASBESTOS. HAZARDOUS. DO NOT DISTURB WITHOUT PROPER TRAINING AND EQUIPMENT.

§ 763.97 Compliance and enforcement.

(a) *Compliance with Title II of the Act.* (1) Section 207(a) of Title II of the Act (15 U.S.C. 2647) makes it unlawful for any local education agency to:

(i) Fail to conduct inspections pursuant to section 203(b) of Title II of the Act, including failure to follow procedures and failure to use accredited personnel and laboratories.

(ii) Knowingly submit false information to the Governor regarding any inspection pursuant to regulations under section 203(i) of Title II of the Act.

(iii) Fail to develop a management plan pursuant to regulations under section 203(i) of Title II of the Act.

(2) Section 207(a) of Title II of the Act (15 U.S.C. 2647) also provides that any local education agency which violates any provision of section 207 shall be liable for a civil penalty of not more than $5,000 for each day during which the violation continues. For the purposes of this subpart, a "violation" means a failure to comply with respect to a single school building.

(b) *Compliance with Title I of the Act.* (1) Section 15(1)(D) of Title I of the Act (15 U.S.C. 2614) makes it unlawful for any person to fail or refuse to comply with any requirement of Title II or any rule promulgated or order issued under Title II. Therefore, any person who violates any requirement of this Subpart is in violation of section 15 of Title I of the Act.

(2) Section 15(3) of Title I of the Act (15 U.S.C. 2614) makes it unlawful for any person to fail or refuse to establish or maintain records, submit reports, notices or other information, or permit access to or copying of records, as required by this Act or a rule thereunder.

(3) Section 15(4) (15 U.S.C. 2614) of Title I of the Act makes it unlawful for any person to fail or refuse to permit entry or inspection as required by section 11 of Title I of the Act.

(4) Section 16(a) of Title I of the Act (15 U.S.C. 2615) provides that any person who violates any provision of section 15 of Title I of the Act shall be liable to the United States for a civil penalty in an amount not to exceed $25,000 for each such violation. Each day such a violation continues shall, for purposes of this paragraph, constitute a separate violation of section 15. A local education agency is not liable for any civil penalty under Title I of the Act for failing or refusing to comply with any rule promulgated or order issued under Title II of the Act.

(c) *Criminal penalties.* If any violation committed by any person (including a local education agency) is knowing or willful, criminal penalties may be assessed under section 16(b) of Title I of the Act.

(d) *Injunctive relief.* The Agency may obtain injunctive relief under section 208(b) of Title II of the Act to respond to a hazard which poses an imminent and substantial endangerment to human health or the environment or section 17 (15 U.S.C. 2616) of Title I of the Act to restrain any violation of section 15 of Title I of the Act or to compel the taking of any action required by or under Title I of the Act.

(e) *Citizen complaints.* Any citizen who wishes to file a complaint pursuant to section 207(d) of Title II of the Act should direct the complaint to the Governor of the State or the EPA Asbestos Ombudsman, 401 M Street, SW., Washington, DC 20460. The citizen complaint should be in writing and identified as a citizen complaint pursuant to section 207(d) of Title II of TSCA. The EPA Asbestos Ombudsman or the Governor shall investigate and respond to the complaint within a reasonable period of time if the allegations provide a reasonable basis to believe that a violation of the Act has occurred.

(f) *Inspections.* EPA may conduct inspections and review management plans under section 11 of Title I of the Act (15 U.S.C. 2610) to ensure compliance.

§ 763.98 Waiver; delegation to State.

(a) *General.* (1) Upon request from a State Governor and after notice and comment and an opportunity for a public hearing in accordance with paragraphs (b) and (c) of this section, EPA may waive some or all of the requirements of this Subpart E if the State has established and is implementing or intends to implement a program of asbestos inspection and management that contains requirements that are at least as stringent as the requirements of this Subpart E.

(2) A waiver from any requirement of this Subpart E shall apply only to the specific provision for which a waiver has been granted under this section. All requirements of this Subpart E shall apply until a waiver is granted under this section.

(b) *Request.* Each request by a Governor to waive any requirement of this Subpart E shall be sent with three complete copies of the request to the Regional Administrator for the EPA Region in which the State is located and shall include:

(1) A copy of the State provisions or proposed provisions relating to its program of asbestos inspection and management in schools for which the request is made.

(2)(i) The name of the State agency that is or will be responsible for administering and enforcing the requirements for which a waiver is requested, the names and job titles of responsible officials in that agency, and phone numbers where the officials can be contacted.

(ii) In the event that more than one agency is or will be responsible for administering and enforcing the requirements for which a waiver is requested, a description of the functions to be performed by each agency, how the program will be coordinated by the lead agency to ensure consistency and ffective administration in the asbestos pection and management program ithin the State, the names and job titles of responsible officials in the agencies, and phone numbers where the officials can be contacted. The lead agency will serve as the central contact point for the EPA.

(3) Detailed reasons, supporting papers, and the rationale for concluding that the State's asbestos inspection and management program provisions for which the request is made are at least as stringent as the requirements of this Subpart E.

(4) A discussion of any special situations, problems, and needs pertaining to the waiver request accompanied by an explanation of how the State intends to handle them.

(5) A statement of the resources that the State intends to devote to the administration and enforcement of the provisions relating to the waiver request.

(6) Copies of any specific or enabling State laws (enacted and pending enactment) and regulations (promulgated and pending promulgation) relating to the request, including provisions for assessing criminal and/or civil penalties.

(7) Assurance from the Governor, the ttorney General, or the legal counsel of the lead agency that the lead agency or other cooperating agencies have the legal authority necessary to carry out the requirements relating to the request.

(c) *General notice—hearing.* (1) Within 30 days after receipt of a request for a waiver, EPA will determine the completeness of the request. If EPA does not request further information within the 30-day period, the request will be deemed complete.

(2) Within 30 days after EPA determines that a request is complete, EPA will issue for publication in the Federal Register a notice that announces receipt of the request, describes the information submitted under paragraph (b) of this section, and solicits written comment from interested members of the public. Comments must be submitted within 60 days.

(3) If, during the comment period, EPA receives a written objection to a Governor's request and a request for a public hearing detailing specific objections to the granting of a waiver, EPA will schedule a public hearing to be held in the affected State after the close of the comment period and will nnounce the public hearing date in the ederal Register before the date of the earing. Each comment shall include the name and address of the person submitting the comment.

(d) *Criteria.* EPA may waive some or all of the requirements of Subpart E of this part if:

(1) The State's lead agency and other cooperating agencies have the legal authority necessary to carry out the provisions of asbestos inspection and management in schools relating to the waiver request.

(2) The State's program of asbestos inspection and management in schools relating to the waiver request and implementation of the program are or will be at least as stringent as the requirements of this Subpart E.

(3) The State has an enforcement mechanism to allow it to implement the program described in the waiver request.

(4) The lead agency and any cooperating agencies have or will have qualified personnel to carry out the provisions relating to the waiver request.

(5) The State will devote adequate resources to the administration and enforcement of the asbestos inspection and management provisions relating to the waiver request.

(6) When specified by EPA, the State gives satisfactory assurances that necessary steps, including specific actions it proposes to take and a time schedule for their accomplishment, will be taken within a reasonable time to conform with applicable criteria under paragraph (d) (2) through (4) of this section.

(e) *Decision.* EPA will issue for publication in the Federal Register a notice announcing its decision to grant or deny, in whole or in part, a Governor's request for a waiver from some or all of the requirements of this Subpart E within 30 days after the close of the comment period or within 30 days following a public hearing, whichever is applicable. The notice will include the Agency's reasons and rationale for granting or denying the Governor's request. The 30-day period may be extended if mutually agreed upon by EPA and the State.

(f) *Modifications.* When any substantial change is made in the administration or enforcement of a State program for which a waiver was granted under this section, a responsible official in the lead agency shall submit such changes to EPA.

(g) *Reports.* The lead agency in each State that has been granted a waiver by EPA from any requirement of Subpart E of this part shall submit a report to the Regional Administrator for the Region in which the State is located at least once every 12 months to include the following information:

(1) A summary of the State's implementation and enforcement activities during the last reporting period relating to provisions waived under this section, including enforcement actions taken.

(2) Any changes in the administration or enforcement of the State program implemented during the last reporting period.

(3) Other reports as may be required by EPA to carry out effective oversight of any requirement of this Subpart E that was waived under this section.

(h) *Oversight.* EPA may periodically evaluate the adequacy of a State's implementation and enforcement of and resources devoted to carrying out requirements relating to the waiver. This evaluation may include, but is not limited to, site visits to local education agencies without prior notice to the State.

(i) *Informal conference.* (1) EPA may request that an informal conference be held between appropriate State and EPA officials when EPA has reason to believe that a State has failed to:

(i) Substantially comply with the terms of any provision that was waived under this section.

(ii) Meet the criteria under paragraph (d) of this section, including the failure to carry out enforcement activities or act on violations of the State program.

(2) EPA will:

(i) Specify to the State those aspects of the State's program believed to be inadequate.

(ii) Specify to the State the facts that underlie the belief of inadequacy.

(3) If EPA finds, on the basis of information submitted by the State at the conference, that deficiencies did not exist or were corrected by the State, no further action is required.

(4) Where EPA finds that deficiencies in the State program exist, a plan to correct the deficiencies shall be negotiated between the State and EPA. The plan shall detail the deficiencies found in the State program, specify the steps the State has taken or will take to remedy the deficiencies, and establish a schedule for each remedial action to be initiated.

(j) *Rescission.* (1) If the State fails to meet with EPA or fails to correct deficiencies raised at the informal conference, EPA will deliver to the Governor of the State and a responsible official in the lead agency a written notice of its intent to rescind, in whole or part, the waiver.

(2) EPA will issue for publication in the Federal Register a notice that announces the rescission of the waiver, describes those aspects of the State's

program determined to be inadequate, and specifies the facts that underlie the findings of inadequacy.

§ 763.99 Exclusions.

(a) A local education agency shall not be required to perform an inspection under § 763.85(a) in any sampling area as defined in 40 CFR 763.103 or homogeneous area of a school building where:

(1) An accredited inspector has determined that, based on sampling records, friable ACBM was identified in that homogeneous or sampling area during an inspection conducted before December 14, 1987. The inspector shall sign and date a statement to that effect with his or her State of accreditation and if applicable, accreditation number and, within 30 days after such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall assess the friable ACBM under § 763.88.

(2) An accredited inspector has determined that, based on sampling records, nonfriable ACBM was identified in that homogeneous or sampling area during an inspection conducted before December 14, 1987. The inspector shall sign and date a statement to that effect with his or her State of accreditation and if applicable, accreditation number and, within 30 days after such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall identify whether material that was nonfriable has become friable since that previous inspection and shall assess the newly-friable ACBM under § 763.88.

(3) Based on sampling records and inspection records, an accredited inspector has determined that no ACBM is present in the homogeneous or sampling area and the records show that the area was sampled, before December 14, 1987 in substantial compliance with § 763.85(a), which for purposes of this section means in a random manner and with a sufficient number of samples to reasonably ensure that the area is not ACBM.

(i) The accredited inspector shall sign and date a statement, with his or her State of accreditation and if applicable, accreditation number that the homogeneous or sampling area determined not to be ACBM was sampled in substantial compliance with § 763.85(a).

(ii) Within 30 days after the inspector's determination, the local education agency shall submit a copy of the inspector's statement to the EPA Regional Office and shall include the statement in the management plan for that school.

(4) The lead agency responsible for asbestos inspection in a State that has been granted a waiver from § 763.85(a) has determined that, based on sampling records and inspection records, no ACBM is present in the homogeneous or sampling area and the records show that the area was sampled before December 14, 1987, in substantial compliance with § 763.85(a). Such determination shall be included in the management plan for that school.

(5) An accredited inspector has determined that, based on records of an inspection conducted before December 14, 1987, suspected ACBM identified in that homogeneous or sampling area is assumed to be ACM. The inspector shall sign and date a statement to that effect, with his or her State of accreditation and if applicable, accreditation number and, within 30 days of such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall identify whether material that was nonfriable suspected ACBM assumed to be ACM has become friable since the previous inspection and shall assess the newly friable material and previously identified friable suspected ACBM assumed to be ACM under § 763.88.

(6) Based on inspection records and contractor and clearance records, an accredited inspector has determined that no ACBM is present in the homogeneous or sampling area where asbestos removal operations have been conducted before December 14, 1987, and shall sign and date a statement to that effect and include his or her State of accreditation and, if applicable, accreditation number. The local education agency shall submit a copy of the statement to the EPA Regional Office and shall include the statement in the management plan for that school.

(7) An architect or project engineer responsible for the construction of a new school building built after October 12, 1988, or an accredited inspector signs a statement that no ACBM was specified as a building material in any construction document for the building, or, to the best of his or her knowledge, no ACBM was used as a building material in the building. The local education agency shall submit a copy of the signed statement of the architect, project engineer, or accredited inspector to the EPA Regional Office and shall include the statement in the management plan for that school.

(b) The exclusion, under paragraph (a) (1) through (4) of this section, from conducting the inspection under § 763.85(a) shall apply only to homogeneous or sampling areas of a school building that were inspected and sampled before October 17, 1987. The local education agency shall conduct an inspection under § 763.85(a) of all areas inspected before October 17, 1987, that were not sampled or were not assumed to be ACM.

(c) If ACBM is subsequently found in a homogeneous or sampling area of a local education agency that had been identified as receiving an exclusion by an accredited inspector under paragraphs (a) (3), (4), (5) of this section, or an architect, project engineer or accredited inspector under paragraph (a)(7) of this section, the local education agency shall have 180 days following the date of identification of ACBM to comply with this Subpart E.

Appendix A to Subpart E—Interim Transmission Electron Microscopy Analytical Methods—Mandatory and Nonmandatory—and Mandatory Section to Determine Completion of Response Actions

I. Introduction

The following appendix contains three units. The first unit is the mandatory transmission electron microscopy (TEM) method which all laboratories must follow; it is the minimum requirement for analysis of air samples for asbestos by TEM. The mandatory method contains the essential elements of the TEM method. The second unit contains the complete non-mandatory method. The non-mandatory method supplements the mandatory method by including additional steps to improve the analysis. EPA recommends that the non-mandatory method be employed for analyzing air filters; however, the laboratory may choose to employ the mandatory method. The non-mandatory method contains the same minimum requirements as are outlined in the mandatory method. Hence, laboratories may choose either of the two methods for analyzing air samples by TEM.

The final unit of this Appendix A to Subpart E defines the steps which must be taken to determine completion of response actions. This unit is mandatory.

II. Mandatory Transmission Electron Microscopy Method

A. Definitions of Terms

1. "Analytical sensitivity"—Airborne asbestos concentration represented by each fiber counted under the electron

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microscope. It is determined by the air volume collected and the proportion of the filter examined. This method requires that the analytical sensitivity be no greater than 0.005 structures/cm^3.

2. "Asbestiform"—A specific type of mineral fibrosity in which the fibers and fibrils possess high tensile strength and flexibility.

3. "Aspect ratio"—A ratio of the length to the width of a particle. Minimum aspect ratio as defined by this method is equal to or greater than 5:1.

4. "Bundle"—A structure composed of three or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.

5. "Clean area"—A controlled environment which is maintained and monitored to assure a low probability of asbestos contamination to materials in that space. Clean areas used in this method have HEPA filtered air under positive pressure and are capable of sustained operation with an open laboratory blank which on subsequent analysis has an average of less than 18 structures/mm^2 in an area of 0.057 mm^2 (nominally 10 200-mesh grid openings) and a maximum of 53 structures/mm^2 for any single preparation for that same area.

6. "Cluster"—A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.

7. "ED"—Electron diffraction.

8. "EDXA"—Energy dispersive X-ray analysis.

9. "Fiber"—A structure greater than or equal to 0.5 µm in length with an aspect ratio (length to width) of 5:1 or greater and having substantially parallel sides.

10. "Grid"—An open structure for mounting on the sample to aid in its examination in the TEM. The term is used here to denote a 200-mesh copper lattice approximately 3 mm in diameter.

11. "Intersection"—Nonparallel touching or crossing of fibers, with the projection having an aspect ratio of 5:1 or greater.

12. "Laboratory sample coordinator"—That person responsible for the conduct of sample handling and the certification of the testing procedures.

13. "Filter background level"—The concentration of structures per square millimeter of filter that is considered indistinguishable from the concentration measured on a blank (filters through which no air has been drawn). For this method the filter background level is defined as 70 structures/mm^2.

14. "Matrix"—Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.

15. "NSD"—No structure detected.

16. "Operator"—A person responsible for the TEM instrumental analysis of the sample.

17. "PCM"—Phase contrast microscopy.

18. "SAED"—Selected area electron diffraction.

19. "SEM"—Scanning electron microscope.

20. "STEM"—Scanning transmission electron microscope.

21. "Structure"—a microscopic bundle, cluster, fiber, or matrix which may contain asbestos.

22. "S/cm^3"—Structures per cubic centimeter.

23. "S/mm^2"—Structures per square millimeter.

24. "TEM"—Transmission electron microscope.

B. Sampling

1. The sampling agency must have written quality control procedures and documents which verify compliance.

2. Sampling operations must be performed by qualified individuals completely independent of the abatement contractor to avoid possible conflict of interest (References 1, 2, 3, and 5 of Unit II.J.).

3. Sampling for airborne asbestos following an abatement action must use commercially available cassettes.

4. Prescreen the loaded cassette collection filters to assure that they do not contain concentrations of asbestos which may interfere with the analysis of the sample. A filter blank average of less than 18 s/mm^2 in an area of 0.057 mm^2 (nominally 10 200-mesh grid openings) and a single preparation with a maximum of 53 s/mm^2 for that same area is acceptable for this method.

5. Use sample collection filters which are either polycarbonate having a pore size less than or equal to 0.4 µm or mixed cellulose ester having a pore size less than or equal to 0.45 µm.

6. Place these filters in series with a 5.0 µm backup filter (to serve as a diffuser) and a support pad. See the following Figure 1:

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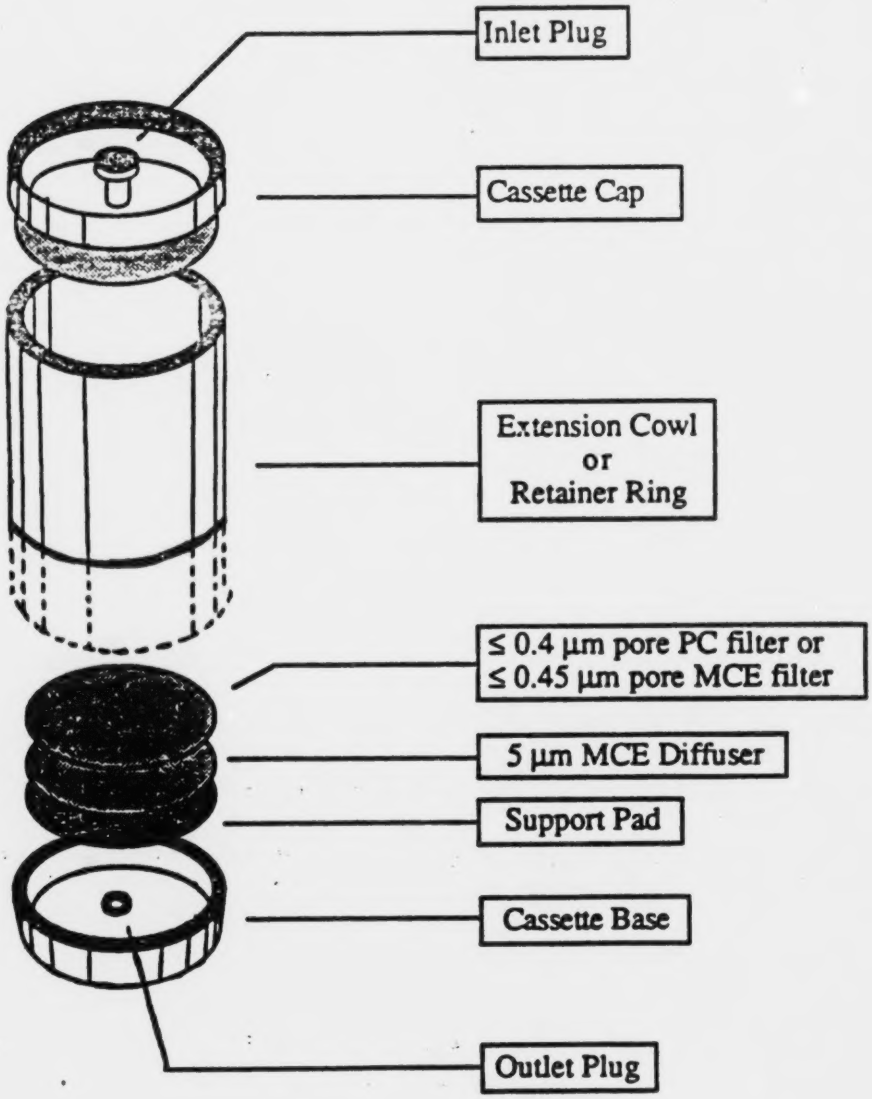
FIGURE I--SAMPLING CASSETTE CONFIGURATION


Inlet Plug
Cassette Cap
Extension Cowl or Retainer Ring
≤ 0.4 µm pore PC filter or ≤ 0.45 µm pore MCE filter
5 µm MCE Diffuser
Support Pad
Cassette Base
Outlet Plug

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7. Reloading of used cassettes is not permitted.

8. Orient the cassette downward at approximately 45 degrees from the horizontal.

9. Maintain a log of all pertinent sampling information.

10. Calibrate sampling pumps and their flow indicators over the range of their intended use with a recognized standard. Assemble the sampling system with a representative filter (not the filter which will be used in sampling) before and after the sampling operation.

11. Record all calibration information.

12. Ensure that the mechanical vibrations from the pump will be minimized to prevent transferral of vibration to the cassette.

13. Ensure that a continuous smooth flow of negative pressure is delivered by the pump by damping out any pump action fluctuations if necessary.

14. The final plastic barrier around the abatement area remains in place for the sampling period.

15. After the area has passed a thorough visual inspection, use aggressive sampling conditions to dislodge any remaining dust. (See suggested protocol in Unit III.B.7.d.)

16. Select an appropriate flow rate equal to or greater than 1 liter per minute (L/min) or less than 10 L/min for 25 mm cassettes. Larger filters may be operated at proportionally higher flow rates.

17. A minimum of 13 samples are to be collected for each testing site consisting of the following:

a. A minimum of five samples per abatement area.

b. A minimum of five samples per ambient area positioned at locations representative of the air entering the abatement site.

c. Two field blanks are to be taken by removing the cap for not more than 30 seconds and replacing it at the time of sampling before sampling is initiated at the following places:

i. Near the entrance to each abatement area.

ii. At one of the ambient sites. (DO NOT leave the field blanks open during the sampling period.)

d. A sealed blank is to be carried with each sample set. This representative cassette is not to be opened in the field.

18. Perform a leak check of the sampling system at each indoor and outdoor sampling site by activating the pump with the closed sampling cassette in line. Any flow indicates a leak which must be eliminated before initiating the sampling operation.

19. The following Table I specifies volume ranges to be used:

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TABLE 1--NUMBER OF 200 MESH EM GRID OPENINGS (0.0057 MM^2) THAT NEED TO BE ANALYZED TO MAINTAIN SENSITIVITY OF 0.005 STRUCTURES/CC BASED ON VOLUME AND EFFECTIVE FILTER AREA

	Effective Filter Area 385 sq mm	
	Volume (liters)	# of grid openings
	560	24
	600	23
	700	19
	800	17
	900	15
	1,000	14
	1,100	12
Recommended Volume Range	1,200	11
	1,300	10
	1,400	10
	1,500	9
	1,600	8
	1,700	8
	1,800	8
	1,900	7
	2,000	7
	2,100	6
	2,200	6
	2,300	6
	2,400	6
	2,500	5
	2,600	5
	2,700	5
	2,800	5
	2,900	5
	3,000	5
	3,100	4
	3,200	4
	3,300	4
	3,400	4
	3,500	4
	3,600	4
	3,700	4
	3,800	4

Effective Filter Area 855 sq mm		
Volume (liters)	# of grid openings	
1,250	24	
1,300	23	
1,400	21	
1,600	19	
1,800	17	
2,000	15	
2,200	14	
2,400	13	
2,600	12	
2,800	11	Recommended Volume Range
3,000	10	
3,200	9	
3,400	9	
3,600	8	
3,800	8	
4,000	8	
4,200	7	
4,400	7	
4,600	7	
4,800	6	
5,000	6	
5,200	6	
5,400	6	
5,600	5	
5,800	5	
6,000	5	
6,200	5	
6,400	5	
6,600	5	
6,800	4	
7,000	4	
7,200	4	
7,400	4	
7,600	4	

Note minimum volumes required:
25 mm : 560 liters
37 mm : 1250 liters

Filter diameter of 25 mm = effective area of 385 sq mm
Filter diameter of 37 mm = effective area of 855 sq mm

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C. Sample Shipment

Ship bulk samples to the analytical laboratory in a separate container from air samples.

D. Sample Receiving

1. Designate one individual as sample coordinator at the laboratory. While that individual will normally be available to receive samples, the coordinator may train and supervise others in receiving procedures for those times when he/she is not available.

2. Bulk samples and air samples delivered to the analytical laboratory in the same container shall be rejected.

E. Sample Preparation

1. All sample preparation and analysis shall be performed by a laboratory independent of the abatement contractor.

2. Wet-wipe the exterior of the cassettes to minimize contamination possibilities before taking them into the clean room facility.

3. Perform sample preparation in a well-equipped clean facility.

Note: The clean area is required to have the following minimum characteristics. The area or hood must be capable of maintaining a positive pressure with make-up air being HEPA-filtered. The cumulative analytical blank concentration must average less than 18 s/mm^2 in an area of 0.057 mm^2 (nominally 10 200-mesh grid openings) and a single preparation with a maximum of 53 s/mm^2 for that same area.

4. Preparation areas for air samples must not only be separated from preparation areas for bulk samples, but they must be prepared in separate rooms.

5. Direct preparation techniques are required. The object is to produce an intact film containing the particulates of the filter surface which is sufficiently clear for TEM analysis.

a. TEM Grid Opening Area measurement must be done as follows:

i. The filter portion being used for sample preparation must have the surface collapsed using an acetone vapor technique.

ii. Measure 20 grid openings on each of 20 random 200-mesh copper grids by placing a grid on a glass and examining it under the PCM. Use a calibrated graticule to measure the average field diameters. From the data, calculate the field area for an average grid opening.

iii. Measurements can also be made on the TEM at a properly calibrated low magnification or on an optical microscope at a magnification of approximately 400X by using an eyepiece fitted with a scale that has been calibrated against a stage micrometer. Optical microscopy utilizing manual or automated procedures may be used providing instrument calibration can be verified.

b. TEM specimen preparation from polycarbonate (PC) filters. Procedures as described in Unit III.G. or other equivalent methods may be used.

c. TEM specimen preparation from mixed cellulose ester (MCE) filters.

i. Filter portion being used for sample preparation must have the surface collapsed using an acetone vapor technique or the Burdette procedure (Ref. 7 of Unit II.J.)

ii. Plasma etching of the collapsed filter is required. The microscope slide to which the collapsed filter pieces are attached is placed in a plasma asher. Because plasma ashers vary greatly in their performance, both from unit to unit and between different positions in the asher chamber, it is difficult to specify the conditions that should be used. Insufficient etching will result in a failure to expose embedded filters, and too much etching may result in loss of particulate from the surface. As an interim measure, it is recommended that the time for ashing of a known weight of a collapsed filter be established and that the etching rate be calculated in terms of micrometers per second. The actual etching time used for the particulate asher and operating conditions will then be set such that a 1–2 μm (10 percent) layer of collapsed surface will be removed.

iii. Procedures as described in Unit III. or other equivalent methods may be used to prepare samples.

F. TEM Method

1. An 80–120 kV TEM capable of performing electron diffraction with a fluorescent screen inscribed with calibrated gradations is required. If the TEM is equipped with EDXA it must either have a STEM attachment or be capable of producing a spot less than 250 nm in diameter at crossover. The microscope shall be calibrated routinely for magnification and camera constant.

2. Determination of Camera Constant and ED Pattern Analysis. The camera length of the TEM in ED operating mode must be calibrated before ED patterns on unknown samples are observed. This can be achieved by using a carbon-coated grid on which a thin film of gold has been sputtered or evaporated. A thin film of gold is evaporated on the specimen TEM grid to obtain zone-axis ED patterns superimposed with a ring pattern from the polycrystalline gold film. In practice, it is desirable to optimize the thickness of the gold film so that only one or two sharp rings are obtained on the superimposed ED pattern. Thicker gold film would normally give multiple gold rings, but it will tend to mask weaker diffraction spots from the unknown fibrous particulate. Since the unknown d-spacings of most interest in asbestos analysis are those which lie closest to the transmitted beam, multiple gold rings are unnecessary on zone-axis ED patterns. An average camera constant using multiple gold rings can be determined. The camera constant is one-half the diameter of the rings times the interplanar spacing of the ring being measured.

3. Magnification Calibration. The magnification calibration must be done at the fluorescent screen. The TEM must be calibrated at the grid opening magnification (if used) and also at the magnification used for fiber counting. This is performed with a cross grating replica (e.g., one containing 2,160 lines/mm). Define a field of view on the fluorescent screen either by markings or physical boundaries. The field of view must be measurable or previously inscribed with a scale or concentric circles (all scales should be metric). A logbook must be maintained, and the dates of calibration and the values obtained must be recorded. The frequency of calibration depends on the past history of the particular microscope. After any maintenance of the microscope that involved adjustment of the power supplied to the lenses or the high-voltage system or the mechanical disassembly of the electron optical column apart from filament exchange, the magnification must be recalibrated. Before the TEM calibration is performed, the analyst must ensure that the cross grating replica is placed at the same distance from the objective lens as the specimens are. For instruments that incorporate an eucentric tilting specimen stage, all specimens and the cross grating replica must be placed at the eucentric position.

4. While not required on every microscope in the laboratory, the laboratory must have either one microscope equipped with energy dispersive X-ray analysis or access to an equivalent system on a TEM in another laboratory.

5. Microscope settings: 80–120 kV, grid assessment 250–1,000X, then 15,000–20,000X screen magnification for analysis.

6. Approximately one-half (0.5) of the predetermined sample area to be analyzed shall be performed on one sample grid preparation and the remaining half on a second sample grid preparation.

7. Individual grid openings with greater than 5 percent openings (holes)

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or covered with greater than 25 percent particulate matter or obviously having nonuniform loading must not be analyzed.

8. Reject the grid if:

a. Less than 50 percent of the grid openings covered by the replica are intact.

b. The replica is doubled or folded.

c. The replica is too dark because of incomplete dissolution of the filter.

9. Recording Rules.

a. Any continuous grouping of particles in which an asbestos fiber with an aspect ratio greater than or equal to 5:1 and a length greater than or equal to 0.5 μm is detected shall be recorded on the count sheet. These will be designated asbestos structures and will be classified as fibers, bundles, clusters, or matrices. Record as individual fibers any contiguous grouping having 0, 1, or 2 definable intersections. Groupings having more than 2 intersections are to be described as cluster or matrix. An intersection is a nonparallel touching or crossing of fibers, with the projection having an aspect ratio of 5:1 or greater. See the following Figure 2:

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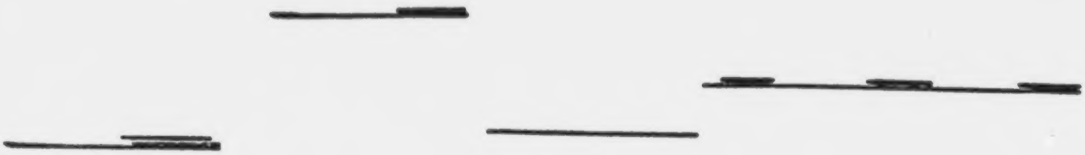
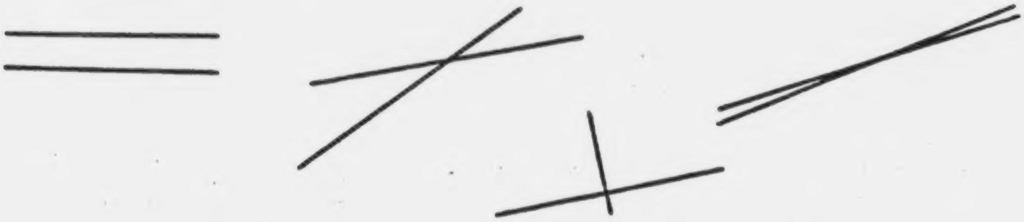
FIGURE 2--COUNTING GUIDELINES USED IN
DETERMINING ASBESTOS STRUCTURES

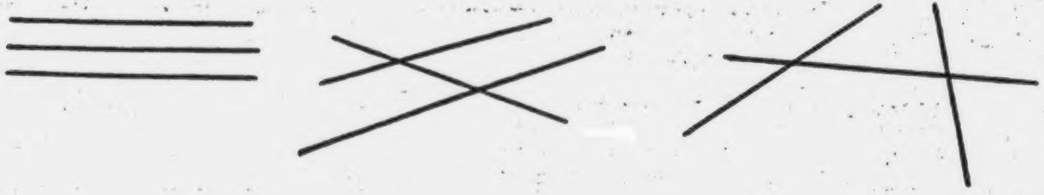
Count as 1 fiber; 1 Structure; no intersections.



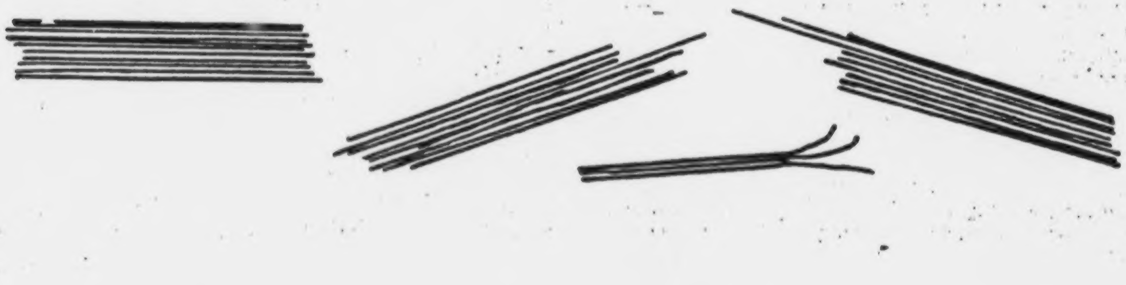
Count as 2 fibers if space between fibers is greater than width of 1 fiber diameter or number of intersections is equal to or less than 1.



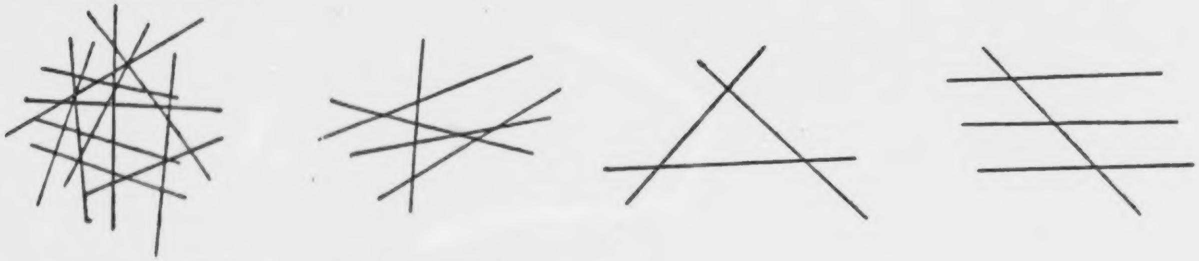
Count as 3 structures if space between fibers is greater than width of 1 fiber diameter or if the number of intersections is equal to or less than 2.



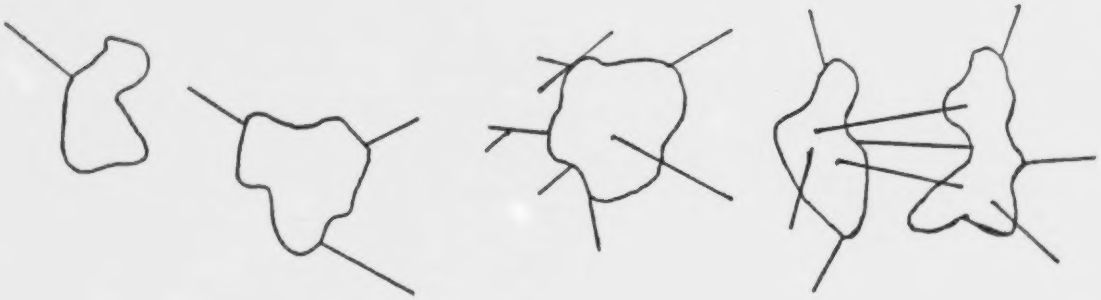
Count bundles as 1 structure; 3 or more parallel fibrils less than 1 fiber diameter separation.



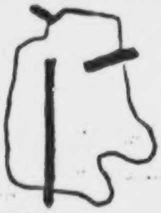
Count clusters as 1 structure; fibers having greater than or equal to 3 intersections.



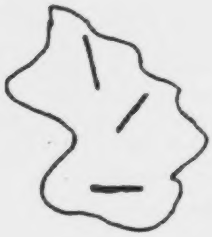
Count matrix as 1 structure.



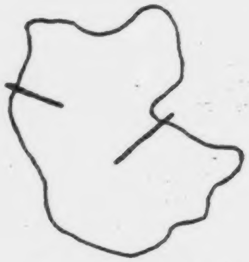
DO NOT COUNT AS STRUCTURES:



Fiber protrusion
<5:1 Aspect Ratio



No fiber protusion



Fiber protrusion
<0.5 micrometer

— <0.5 micrometer in length
▬ <5:1 Aspect Ratio

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i. *Fiber.* A structure having a minimum length greater than or equal to 0.5 µm and an aspect ratio (length to width) of 5:1 or greater and substantially parallel sides. Note the appearance of the end of the fiber, i.e., whether it is flat, rounded or dovetailed.

ii. *Bundle.* A structure composed of three or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.

iii. *Cluster.* A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.

iv. *Matrix.* Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.

b. Separate categories will be maintained for fibers less than 5 µm and for fibers equal to or greater than 5 µm in length.

c. Record NSD when no structures are detected in the field.

d. Visual identification of electron diffraction (ED) patterns is required for each asbestos structure counted which would cause the analysis to exceed the 70 s/mm^2 concentration. (Generally this means the first four fibers identified as asbestos must exhibit an identifiable diffraction pattern for chrysotile or amphibole.)

e. The micrograph number of the recorded diffraction patterns must be reported to the client and maintained in the laboratory's quality assurance records. In the event that examination of the pattern by a qualified individual indicates that the pattern has been misidentified visually, the client shall be contacted.

f. Energy Dispersive X-ray Analysis (EDXA) is required of all amphiboles which would cause the analysis results to exceed the 70 s/mm^2 concentration. (Generally speaking, the first 4 amphiboles would require EDXA.)

g. If the number of fibers in the nonasbestos class would cause the analysis to exceed the 70 s/mm^2 concentration, the fact that they are not asbestos must be confirmed by EDXA or measurement of a zone axis diffraction pattern.

h. Fibers classified as chrysotile must be identified by diffraction or X-ray analysis and recorded on a count sheet. X-ray analysis alone can be used only after 70 s/mm^2 have been exceeded for a particular sample.

i. Fibers classified as amphiboles must be identified by X-ray analysis and electron diffraction and recorded on the count sheet. (X-ray analysis alone can be used only after 70 s/mm^2 have been exceeded for a particular sample.)

j. If a diffraction pattern was recorded on film, record the micrograph number on the count sheet.

k. If an electron diffraction was attempted but no pattern was observed, record N on the count sheet.

l. If an EDXA spectrum was attempted but not observed, record N on the count sheet.

m. If an X-ray analysis spectrum is stored, record the file and disk number on the count sheet.

10. Classification Rules.

a. *Fiber.* A structure having a minimum length greater than or equal to 0.5 µm and an aspect ratio (length to width) of 5:1 or greater and substantially parallel sides. Note the appearance of the end of the fiber, i.e., whether it is flat, rounded or dovetailed.

b. *Bundle.* A structure composed of three or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.

c. *Cluster.* A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.

d. *Matrix.* Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.

11. After finishing with a grid, remove it from the microscope, and replace it in the appropriate grid holder. Sample grids must be stored for a minimum of 1 year from the date of the analysis; the sample cassette must be retained for a minimum of 30 days by the laboratory or returned at the client's request.

G. Sample Analytical Sequence

1. Under the present sampling requirements a minimum of 13 samples is to be collected for the clearance testing of an abatement site. These include five abatement area samples, five ambient samples, two field blanks, and one sealed blank.

2. Carry out visual inspection of work site prior to air monitoring.

3. Collect a minimum of 5 air samples inside the work site and 5 samples outside the work site. The indoor and outdoor samples shall be taken during the same time period.

4. Remaining steps in the analytical sequence are contained in Unit IV of this Appendix.

H. Reporting

1. The following information must be reported to the client for each sample analyzed:

a. Concentration in structures per square millimeter and structures per cubic centimeter.

b. Analytical sensitivity used for the analysis.

c. Number of asbestos structures.

d. Area analyzed.

e. Volume of air sampled (which must be initially supplied to lab by client).

f. Copy of the count sheet must be included with the report.

g. Signature of laboratory official to indicate that the laboratory met specifications of the method.

h. Report form must contain official laboratory identification (e.g., letterhead).

i. Type of asbestos.

I. Quality Control/Quality Assurance Procedures (Data Quality Indicators)

Monitoring the environment for airborne asbestos requires the use of sensitive sampling and analysis procedures. Because the test is sensitive, it may be influenced by a variety of factors. These include the supplies used in the sampling operation, the performance of the sampling, the preparation of the grid from the filter and the actual examination of this grid in the microscope. Each of these unit operations must produce a product of defined quality if the analytical result is to be a reliable and meaningful test result. Accordingly, a series of control checks and reference standards are to be performed along with the sample analysis as indicators that the materials used are adequate and the operations are within acceptable limits. In this way, the quality of the data is defined and the results are of known value. These checks and tests also provide timely and specific warning of any problems which might develop within the sampling and analysis operations. A description of these quality control/quality assurance procedures is summarized in the following Table III:

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TABLE III--SUMMARY OF LABORATORY DATA QUALITY OBJECTIVES

Unit Operation	QC Check	Frequency	Conformance Expectation
Sample receiving	Review of receiving report	Each sample	95% complete
Sample custody	Review of chain-of-custody record	Each sample	95% complete
Sample preparation	Supplies and reagents	On receipt	Meet specs. or reject
	Grid opening size	20 openings/20 grids/lot of 1000 or 1 opening/sample	100%
	Special clean area monitoring	After cleaning or service	Meet specs or reclean
	Laboratory blank	1 per prep series or 10%	Meet specs. or reanalyze series
	Plasma etch blank	1 per 20 samples	75%
	Multiple preps (3 per sample)	Each sample	One with cover of 15 complete grid sqs.
Sample analysis	System check	Each day	Each day
	Alignment check	Each day	Each day
	Magnification calibration with low and high standards	Each month or after service	95%
	ED calibration by gold standard	Weekly	95%
	EDS calibration by copper line	Daily	95%
Performance check	Laboratory blank (measure of cleanliness)	Prep 1 per series or 10% read 1 per 25 samples	Meet specs or reanalyze series
	Replicate counting (measure of precision)	1 per 100 samples	1.5 x Poisson Std. Dev.
	Duplicate analysis (measure of reproducibility)	1 per 100 samples	2 x Poisson Std. Dev.
	Known samples of typical materials (working standards)	Training and for comparison with unknowns	100%
	Analysis of NBS SRM 1876 and/or RM 8410 (measure of accuracy and comparability)	1 per analyst per year	1.5 x Poisson Std. Dev.
	Data entry review (data validation and measure of completeness)	Each sample	95%
	Record and verify ID electron diffraction pattern of structure	1 per 5 samples	80% accuracy
Calculations and data reduction	Hand calculation of automated data reduction procedure or independent recalculation of hand-calculated data	1 per 100 samples	85%

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1. When the samples arrive at the laboratory, check the samples and documentation for completeness and requirements before initiating the analysis.

2. Check all laboratory reagents and supplies for acceptable asbestos background levels.

3. Conduct all sample preparation in a clean room environment monitored by laboratory blanks. Testing with blanks must also be done after cleaning or servicing the room.

4. Prepare multiple grids of each sample.

5. Provide laboratory blanks with each sample batch. Maintain a cumulative average of these results. If there are more than 53 fibers/mm^2 per 10 200-mesh grid openings, the system must be checked for possible sources of contamination.

6. Perform a system check on the transmission electron microscope daily.

7. Make periodic performance checks of magnification, electron diffraction and energy dispersive X-ray systems as set forth in Table III under Unit II.I.

8. Ensure qualified operator performance by evaluation of replicate analysis and standard sample comparisons as set forth in Table III under Unit II.I.

9. Validate all data entries.

10. Recalculate a percentage of all computations and automatic data reduction steps as specified in Table III under Unit II.I.

11. Record an electron diffraction pattern of one asbestos structure from every five samples that contain asbestos. Verify the identification of the pattern by measurement or comparison of the pattern with patterns collected from standards under the same conditions. The records must also demonstrate that the identification of the pattern has been verified by a qualified individual and that the operator who made the identification is maintaining at least an 80 percent correct visual identification based on his measured patterns.

12. Appropriate logs or records must be maintained by the analytical laboratory verifying that it is in compliance with the mandatory quality assurance procedures.

J. References

For additional background information on this method, the following references should be consulted.

1. "Guidance for Controlling Asbestos-Containing Materials in Buildings," EPA 560/5-85-024, June 1985.

2. "Measuring Airborne Asbestos Following an Abatement Action," USEPA, Office of Toxic Substances, EPA 600/4-85-049, 1985.

3. Small, John and E. Steel. Asbestos Standards: Materials and Analytical Methods. N.B.S. Special Publication 619, 1982.

4. Campbell, W.J., R.L. Blake, L.L. Brown, E.E. Cather, and J.J. Sjoberg. Selected Silicate Minerals and Their Asbestiform Varieties. Information Circular 8751, U.S. Bureau of Mines, 1977.

5. Quality Assurance Handbook for Air Pollution Measurement System. Ambient Air Methods, EPA 600/4-77-027a, USEPA, Office of Research and Development, 1977.

6. Method 2A: Direct Measurement of Gas Volume through Pipes and Small Ducts. 40 CFR Part 60 Appendix A.

7. Burdette, G.J., Health & Safety Exec. Research & Lab. Services Div., London, "Proposed Analytical Method for Determination of Asbestos in Air."

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11. "Guidance to the Preparation of Quality Assurance Project Plans," USEPA, Office of Toxic Substances, 1984.

III. Nonmandatory Transmission Electron Microscopy Method

A. Definitions of Terms

1. "Analytical sensitivity"—Airborne asbestos concentration represented by each fiber counted under the electron microscope. It is determined by the air volume collected and the proportion of the filter examined. This method requires that the analytical sensitivity be no greater than 0.005 s/cm^3.

2. "Asbestiform"—A specific type of mineral fibrosity in which the fibers and fibrils possess high tensile strength and flexibility.

3. "Aspect ratio"—A ratio of the length to the width of a particle. Minimum aspect ratio as defined by this method is equal to or greater than 5:1.

4. "Bundle"—A structure composed of three or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.

5. "Clean area"—A controlled environment which is maintained and monitored to assure a low probability of asbestos contamination to materials in that space. Clean areas used in this method have HEPA filtered air under positive pressure and are capable of sustained operation with an open laboratory blank which on subsequent analysis has an average of less than 18 structures/mm^2 in an area of 0.057 mm^2 (nominally 10 200 mesh grid openings) and a maximum of 53 structures/mm^2 for no more than one single preparation for that same area.

6. "Cluster"—A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.

7. "ED"—Electron diffraction.

8. "EDXA"—Energy dispersive X-ray analysis.

9. "Fiber"—A structure greater than or equal to 0.5 μm in length with an aspect ratio (length to width) of 5:1 or greater and having substantially parallel sides.

10. "Grid"—An open structure for mounting on the sample to aid in its examination in the TEM. The term is used here to denote a 200-mesh copper lattice approximately 3 mm in diameter.

11. "Intersection"—Nonparallel touching or crossing of fibers, with the projection having an aspect ratio of 5:1 or greater.

12. "Laboratory sample coordinator"—That person responsible for the conduct of sample handling and the certification of the testing procedures.

13. "Filter background level"—The concentration of structures per square millimeter of filter that is considered indistinguishable from the concentration measured on blanks (filters through which no air has been drawn). For this method the filter background level is defined as 70 structures/mm^2.

14. "Matrix"—Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.

15. "NSD"—No structure detected.

16. "Operator"—A person responsible for the TEM instrumental analysis of the sample.

17. "PCM"—Phase contrast microscopy.

18. "SAED"—Selected area electron diffraction.

19. "SEM"—Scanning electron microscope.

20. "STEM"—Scanning transmission electron microscope.

21. "Structure"—a microscopic bundle, cluster, fiber, or matrix which may contain asbestos.

22. "S/cm³"—Structures per cubic centimeter.

23. "S/mm²"—Structures per square millimeter.

24. "TEM"—Transmission electron microscope.

B. Sampling

1. Sampling operations must be performed by qualified individuals completely independent of the abatement contractor to avoid possible conflict of interest (See References 1, 2, and 5 of Unit III.L.) Special precautions should be taken to avoid contamination of the sample. For example, materials that have not been prescreened for their asbestos background content should not be used; also, sample handling procedures which do not take cross contamination possibilities into account should not be used.

2. Material and supply checks for asbestos contamination should be made on all critical supplies, reagents, and procedures before their use in a monitoring study.

3. Quality control and quality assurance steps are needed to identify problem areas and isolate the cause of the contamination (see Reference 5 of Unit III.L.). Control checks shall be permanently recorded to document the quality of the information produced. The sampling firm must have written quality control procedures and documents which verify compliance. Independent audits by a qualified consultant or firm should be performed once a year. All documentation of compliance should be retained indefinitely to provide a guarantee of quality. A summary of Sample Data Quality Objectives is shown in Table II of Unit II.B.

4. Sampling materials.

a. Sample for airborne asbestos following an abatement action using commercially available cassettes.

b. Use either a cowling or a filter-retaining middle piece. Conductive material may reduce the potential for particulates to adhere to the walls of the cowl.

c. Cassettes must be verified as "clean" prior to use in the field. If packaged filters are used for loading or preloaded cassettes are purchased from the manufacturer or a distributor, the manufacturer's name and lot number should be entered on all field data sheets provided to the laboratory, and are required to be listed on all reports from the laboratory.

d. Assemble the cassettes in a clean facility (See definition of clean area under Unit III.A.).

e. Reloading of used cassettes is not permitted.

f. Use sample collection filters which are either polycarbonate having a pore size of less than or equal to 0.4 µm or mixed cellulose ester having a pore size of less than or equal to 0.45 µm.

g. Place these filters in series with a backup filter with a pore size of 5.0 µm (to serve as a diffuser) and a support pad. See the following Figure 1.

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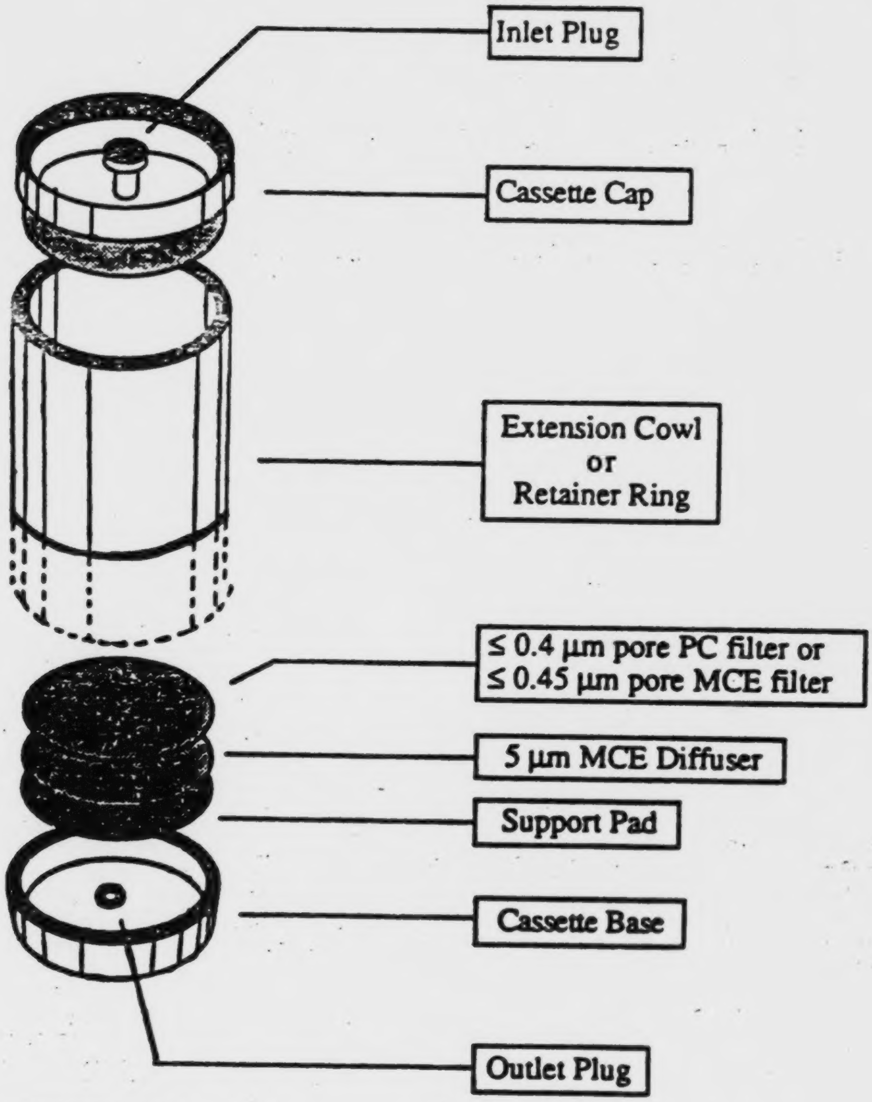
FIGURE I--SAMPLING CASSETTE CONFIGURATION


Inlet Plug
Cassette Cap
Extension Cowl or Retainer Ring
≤ 0.4 µm pore PC filter or ≤ 0.45 µm pore MCE filter
5 µm MCE Diffuser
Support Pad
Cassette Base
Outlet Plug

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h. When polycarbonate filters are used, position the highly reflective face such that the incoming particulate is received on this surface.

i. Seal the cassettes to prevent leakage around the filter edges or between cassette part joints. A mechanical press may be useful to achieve a reproducible leak-free seal. Shrink fit gel-bands may be used for this purpose and are available from filter manufacturers and their authorized distributors.

j. Use wrinkle-free loaded cassettes in the sampling operation.

5. Pump setup.

a. Calibrate the sampling pump over the range of flow rates and loads anticipated for the monitoring period with this flow measuring device in series. Perform this calibration using guidance from EPA Method 2A each time the unit is sent to the field (See Reference 6 of Unit III.L.).

b. Configure the sampling system to preclude pump vibrations from being transmitted to the cassette by using a sampling stand separate from the pump station and making connections with flexible tubing.

c. Maintain continuous smooth flow conditions by damping out any pump action fluctuations if necessary.

d. Check the sampling system for leaks with the end cap still in place and the pump operating before initiating sample collection. Trace and stop the source of any flow indicated by the flowmeter under these conditions.

e. Select an appropriate flow rate equal to or greater than 1 L/min or less than 10 L/min for 25 mm cassettes. Larger filters may be operated at proportionally higher flow rates.

f. Orient the cassette downward at approximately 45 degrees from the horizontal.

g. Maintain a log of all pertinent sampling information, such as pump identification number, calibration data, sample location, date, sample identification number, flow rates at the beginning, middle, and end, start and stop times, and other useful information or comments. Use of a sampling log form is recommended. See the following Figure 2:

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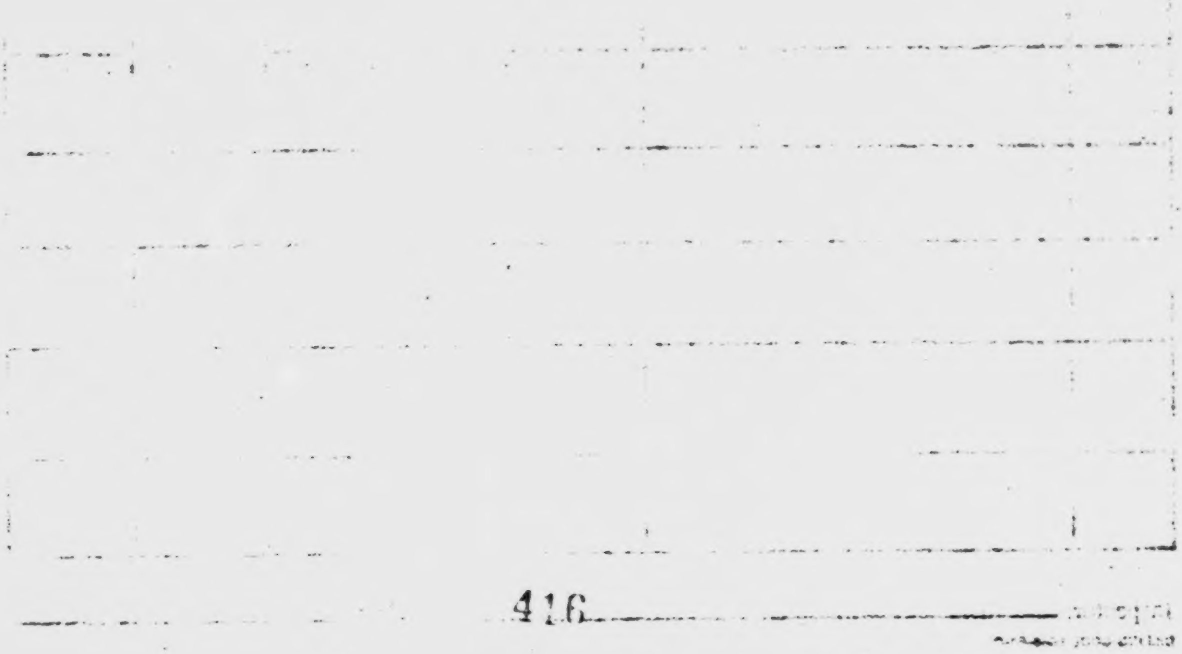

FIGURE 2--SAMPLING LOG FORM

Sample Number	Location of Sample	Pump I.D.	Start Time	Middle Time	End Time	Flow Rate

Inspector: ______________________________ Date: ____________________

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h. Initiate a chain of custody procedure at the start of each sampling, if this is requested by the client.

i. Maintain a close check of all aspects of the sampling operation on a regular basis.

j. Continue sampling until at least the minimum volume is collected, as specified in the following Table I:

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TABLE 1--NUMBER OF 200 MESH EM GRID OPENINGS ($0.0057\ MM^2$) THAT NEED TO BE ANALYZED TO MAINTAIN SENSITIVITY OF 0.005 STRUCTURES/CC BASED ON VOLUME AND EFFECTIVE FILTER AREA

		Effective Filter Area 385 sq mm
	Volume (liters)	# of grid openings
	560	24
	600	23
	700	19
	800	17
	900	15
	1,000	14
	1,100	12
Recommended Volume Range	1,200	11
	1,300	10
	1,400	10
	1,500	9
	1,600	8
	1,700	8
	1,800	8
	1,900	7
	2,000	7
	2,100	6
	2,200	6
	2,300	6
	2,400	6
	2,500	5
	2,600	5
	2,700	5
	2,800	5
	2,900	5
	3,000	5
	3,100	4
	3,200	4
	3,300	4
	3,400	4
	3,500	4
	3,600	4
	3,700	4
	3,800	4

Effective Filter Area 855 sq mm		
Volume (liters)	# of grid openings	
1,250	24	
1,300	23	
1,400	21	
1,600	19	
1,800	17	
2,000	15	
2,200	14	
2,400	13	
2,600	12	
2,800	11	Recommended Volume Range
3,000	10	
3,200	9	
3,400	9	
3,600	8	
3,800	8	
4,000	8	
4,200	7	
4,400	7	
4,600	7	
4,800	6	
5,000	6	
5,200	6	
5,400	6	
5,600	5	
5,800	5	
6,000	5	
6,200	5	
6,400	5	
6,600	5	
6,800	4	
7,000	4	
7,200	4	
7,400	4	
7,600	4	

Note minimum volumes required:

25 mm	560 liters
37 mm	1250 liters

Filter diameter of 25 mm = effective area of 385 sq mm
Filter diameter of 37 mm = effective area of 855 sq mm

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k. At the conclusion of sampling, turn the cassette upward before stopping the flow to minimize possible particle loss. If the sampling is resumed, restart the flow before reorienting the cassette downward. Note the condition of the filter at the conclusion of sampling.

l. Double check to see that all information has been recorded on the data collection forms and that the cassette is securely closed and appropriately identified using a waterproof label. Protect cassettes in individual clean resealed polyethylene bags. Bags are to be used for storing cassette caps when they are removed for sampling purposes. Caps and plugs should only be removed or replaced using clean hands or clean disposable plastic gloves.

m. Do not change containers if portions of these filters are taken for other purposes.

6. Minimum sample number per site. A minimum of 13 samples are to be collected for each testing consisting of the following:

a. A minimum of five samples per abatement area.

b. A minimum of five samples per ambient area positioned at locations representative of the air entering the abatement site.

c. Two field blanks are to be taken by removing the cap for not more than 30 sec and replacing it at the time of sampling before sampling is initiated at the following places:

i. Near the entrance to each ambient area.

ii. At one of the ambient sites.

(Note: Do not leave the blank open during the sampling period.)

d. A sealed blank is to be carried with each sample set. This representative cassette is not to be opened in the field.

7. Abatement area sampling.

a. Conduct final clearance sampling only after the primary containment barriers have been removed; the abatement area has been thoroughly dried; and, it has passed visual inspection tests by qualified personnel. (See Reference 1 of Unit III.L.)

b. Containment barriers over windows, doors, and air passageways must remain in place until the TEM clearance sampling and analysis is completed and results meet clearance test criteria. The final plastic barrier remains in place for the sampling period.

c. Select sampling sites in the abatement area on a random basis to provide unbiased and representative samples.

d. After the area has passed a thorough visual inspection, use aggressive sampling conditions to dislodge any remaining dust.

i. Equipment used in aggressive sampling such as a leaf blower and/or fan should be properly cleaned and decontaminated before use.

ii. Air filtration units shall remain on during the air monitoring period.

iii. Prior to air monitoring, floors, ceiling and walls shall be swept with the exhaust of a minimum one (1) horsepower leaf blower.

iv. Stationary fans are placed in locations which will not interfere with air monitoring equipment. Fan air is directed toward the ceiling. One fan shall be used for each 10,000 ft ^{3} of worksite.

v. Monitoring of an abatement work area with high-volume pumps and the use of circulating fans will require electrical power. Electrical outlets in the abatement area may be used if available. If no such outlets are available, the equipment must be supplied with electricity by the use of extension cords and strip plug units. All electrical power supply equipment of this type must be approved Underwriter Laboratory equipment that has not been modified. All wiring must be grounded. Ground fault interrupters should be used. Extreme care must be taken to clean up any residual water and ensure that electrical equipment does not become wet while operational.

vi. Low volume pumps may be carefully wrapped in 6-mil polyethylene to insulate the pump from the air. High volume pumps cannot be sealed in this manner since the heat of the motor may melt the plastic. The pump exhausts should be kept free.

vii. If recleaning is necessary, removal of this equipment from the work area must be handled with care. It is not possible to completely decontaminate the pump motor and parts since these areas cannot be wetted. To minimize any problems in this area, all equipment such as fans and pumps should be carefully wet wiped prior to removal from the abatement area. Wrapping and sealing low volume pumps in 6-mil polyethylene will provide easier decontamination of this equipment. Use of clean water and disposable wipes should be available for this purpose.

e. Pump flow rate equal to or greater than 1 L/min or less than 10 L/min may be used for 25 mm cassettes. The larger cassette diameters may have comparably increased flow.

f. Sample a volume of air sufficient to ensure the minimum quantitation limits. (See Table I of Unit III.B.5.j.)

8. Ambient sampling.

a. Position ambient samplers at locations representative of the air entering the abatement site. If makeup air entering the abatement site is drawn from another area of the building which is outside of the abatement area, place the pumps in the building, pumps should be placed out of doors located near the building and away from any obstructions that may influence wind patterns. If construction is in progress immediately outside the enclosure, it may be necessary to select another ambient site. Samples should be representative of any air entering the work site.

b. Locate the ambient samplers at least 3 ft apart and protect them from adverse weather conditions.

c. Sample same volume of air as samples taken inside the abatement site.

C. Sample Shipment

1. Ship bulk samples in a separate container from air samples. Bulk samples and air samples delivered to the analytical laboratory in the same container shall be rejected.

2. Select a rigid shipping container and pack the cassettes upright in a noncontaminating nonfibrous medium such as a bubble pack. The use of resealable polyethylene bags may help to prevent jostling of individual cassettes.

3. Avoid using expanded polystyrene because of its static charge potential. Also avoid using particle-based packaging materials because of possible contamination.

4. Include a shipping bill and a detailed listing of samples shipped, their descriptions and all identifying numbers or marks, sampling data, shipper's name, and contact information. For each sample set, designate which are the ambient samples, which are the abatement area samples, which are the field blanks, and which is the sealed blank if sequential analysis is to be performed.

5. Hand-carry samples to the laboratory in an upright position if possible; otherwise choose that mode of transportation least likely to jar the samples in transit.

6. Address the package to the laboratory sample coordinator by name when known and alert him or her of the package description, shipment mode, and anticipated arrival as part of the chain of custody and sample tracking procedures. This will also help the laboratory schedule timely analysis for the samples when they are received.

D. Quality Control/Quality Assurance Procedures (Data Quality Indicators)

Monitoring the environment for airborne asbestos requires the use of sensitive sampling and analysis procedures. Because the test is sensitive, it may be influenced by a variety of factors. These include the supplies used in the sampling operation, the performance of the sampling, the preparation of the grid from the filter and the actual examination of this grid in the microscope. Each of these unit operations must produce a product of defined quality if the analytical result is to be a reliable and meaningful test result. Accordingly, a series of control checks and reference standards is performed along with the sample analysis as indicators that the materials used are adequate and the operations are within acceptable limits. In this way the quality of the data is defined, and the results are of known value. These checks and tests also provide timely and specific warning of any problems which might develop within the sampling and analysis operations. A description of these quality control/quality assurance procedures is summarized in the text below.

1. Prescreen the loaded cassette collection filters to assure that they do not contain concentrations of asbestos which may interfere with the analysis of the sample. A filter blank average of less than 18 s/mm^2 in an area of 0.057 mm^2 (nominally 10 200-mesh grid openings) and a maximum of 53 s/mm^2 for that same area for any single preparation is acceptable for this method.

2. Calibrate sampling pumps and their flow indicators over the range of their intended use with a recognized standard. Assemble the sampling system with a representative filter—not the filter which will be used in sampling—before and after the sampling operation.

3. Record all calibration information with the data to be used on a standard sampling form.

4. Ensure that the samples are stored in a secure and representative location.

5. Ensure that mechanical calibrations from the pump will be minimized to prevent transferral of vibration to the cassette.

6. Ensure that a continuous smooth flow of negative pressure is delivered by the pump by installing a damping chamber if necessary.

7. Open a loaded cassette momentarily at one of the indoor sampling sites when sampling is initiated. This sample will serve as an indoor field blank.

8. Open a loaded cassette momentarily at one of the outdoor sampling sites when sampling is initiated. This sample will serve as an outdoor field blank.

9. Carry a sealed blank into the field with each sample series. Do not open this cassette in the field.

10. Perform a leak check of the sampling system at each indoor and outdoor sampling site by activating the pump with the closed sampling cassette in line. Any flow indicates a leak which must be eliminated before initiating the sampling operation.

11. Ensure that the sampler is turned upright before interrupting the pump flow.

12. Check that all samples are clearly labeled and that all pertinent information has been enclosed before transfer of the samples to the laboratory.

E. Sample Receiving

1. Designate one individual as sample coordinator at the laboratory. While that individual will normally be available to receive samples, the coordinator may train and supervise others in receiving procedures for those times when he/she is not available.

2. Adhere to the following procedures to ensure both the continued chain-of-custody and the accountability of all samples passing through the laboratory:

a. Note the condition of the shipping package and data written on it upon receipt.

b. Retain all bills of lading or shipping slips to document the shipper and delivery time.

c. Examine the chain-of-custody seal, if any, and the package for its integrity.

d. If there has been a break in the seal or substantive damage to the package, the sample coordinator shall immediately notify the shipper and a responsible laboratory manager before any action is taken to unpack the shipment.

e. Packages with significant damage shall be accepted only by the responsible laboratory manager after discussions with the client.

3. Unwrap the shipment in a clean, uncluttered facility. The sample coordinator or his or her designee will record the contents, including a description of each item and all identifying numbers or marks. A Sample Receiving Form to document this information is attached for use when necessary. (See the following Figure 3.)

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FIGURE 3--SAMPLE RECEIVING FORM

Date of package delivery ________________ Package shipped from ____________________

Carrier ____________________________ Shipping bill retained ____________________

*Condition of package on receipt____

*Condition of custody seal ____

Number of samples received ______________ Shipping manifest attached ________________

Purchase Order No. ____________________ Project I.D. ____________________________

Comments ____

No.	Description	Sampling Medium		Sampled Volume	Receiving	Assigned #
		PC	MCE	Liters	ID #	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

(Use as many additional sheets as needed.)

Comments ____

Date of acceptance into sample bank ____

Signature of chain-of-custody recipient ____

Disposition of samples____

*Note: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.

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Note.—The person breaking the chain-of-custody seal and itemizing the contents assumes responsibility for the shipment and signs documents accordingly.

4. Assign a laboratory number and schedule an analysis sequence.

5. Manage all chain-of-custody samples within the laboratory such that their integrity can be ensured and documented.

F. Sample Preparation

1. Personnel not affiliated with the Abatement Contractor shall be used to prepare samples and conduct TEM analysis. Wet-wipe the exterior of the cassettes to minimize contamination possibilities before taking them to the clean sample preparation facility.

2. Perform sample preparation in a well-equipped clean facility.

Note.—The clean area is required to have the following minimum characteristics. The area or hood must be capable of maintaining a positive pressure with make-up air being HEPA filtered. The cumulative analytical blank concentration must average less than 18 s/mm² in an area of 0.057 s/mm² (nominally 10 200-mesh grid openings) with no more than one single preparation to exceed 53 s/mm² for that same area.

3. Preparation areas for air samples must be separated from preparation areas for bulk samples. Personnel must not prepare air samples if they have previously been preparing bulk samples without performing appropriate personal hygiene procedures, i.e., clothing change, showering, etc.

4. Preparation. Direct preparation techniques are required. The objective is to produce an intact carbon film containing the particulates from the filter surface which is sufficiently clear for TEM analysis. Currently recommended direct preparation procedures for polycarbonate (PC) and mixed cellulose ester (MCE) filters are described in Unit III.F.7. and 8. Sample preparation is a subject requiring additional research. Variation on those steps which do not substantively change the procedure, which improve filter clearing or which reduce contamination problems in a laboratory are permitted.

a. Use only TEM grids that have had grid opening areas measured according to directions in Unit III.J.

b. Remove the inlet and outlet plugs prior to opening the cassette to minimize any pressure differential that may be present.

c. Examples of techniques used to prepare polycarbonate filters are described in Unit III.F.7.

d. Examples of techniques used to prepare mixed cellulose ester filters are described in Unit III.F.8.

e. Prepare multiple grids for each sample.

f. Store the three grids to be measured in appropriately labeled grid holders or polyethylene capsules.

5. Equipment.

a. Clean area.

b. Tweezers. Fine-point tweezers for handling of filters and TEM grids.

c. Scalpel Holder and Curved No. 10 Surgical Blades.

d. Microscope slides.

e. Double-coated adhesive tape.

f. Gummed page reinforcements.

g. Micro-pipet with disposal tips 10 to 100 μL variable volume.

h. Vacuum coating unit with facilities for evaporation of carbon. Use of a liquid nitrogen cold trap above the diffusion pump will minimize the possibility of contamination of the filter surface by oil from the pumping system. The vacuum-coating unit can also be used for deposition of a thin film of gold.

i. Carbon rod electrodes. Spectrochemically pure carbon rods are required for use in the vacuum evaporator for carbon coating of filters.

j. Carbon rod sharpener. This is used to sharpen carbon rods to a neck. The use of necked carbon rods (or equivalent) allows the carbon to be applied to the filters with a minimum of heating.

k. Low-temperature plasma asher. This is used to etch the surface of collapsed mixed cellulose ester (MCE) filters. The asher should be supplied with oxygen, and should be modified as necessary to provide a throttle or bleed valve to control the speed of the vacuum to minimize disturbance of the filter. Some early models of ashers admit air too rapidly, which may disturb particulates on the surface of the filter during the etching step.

l. Glass petri dishes, 10 cm in diameter, 1 cm high. For prevention of excessive evaporation of solvent when these are in use, a good seal must be provided between the base and the lid. The seal can be improved by grinding the base and lid together with an abrasive grinding material.

m. Stainless steel mesh.

n. Lens tissue.

o. Copper 200-mesh TEM grids, 3 mm in diameter, or equivalent.

p. Gold 200-mesh TEM grids, 3 mm in diameter, or equivalent.

q. Condensation washer.

r. Carbon-coated, 200-mesh TEM grids, or equivalent.

s. Analytical balance, 0.1 mg sensitivity.

t. Filter paper, 9 cm in diameter.

u. Oven or slide warmer. Must be capable of maintaining a temperature of 65–70 °C.

v. Polyurethane foam, 6 mm thickness.

w. Gold wire for evaporation.

6. Reagents.

a. General. A supply of ultra-clean, fiber-free water must be available for washing of all components used in the analysis. Water that has been distilled in glass or filtered or deionized water is satisfactory for this purpose. Reagents must be fiber-free.

b. Polycarbonate preparation method—chloroform.

c. Mixed Cellulose Ester (MCE) preparation method—acetone or the Burdette procedure (Ref. 7 of Unit III.L.).

7. TEM specimen preparation from polycarbonate filters.

a. Specimen preparation laboratory. It is most important to ensure that contamination of TEM specimens by extraneous asbestos fibers is minimized during preparation.

b. Cleaning of sample cassettes. Upon receipt at the analytical laboratory and before they are taken into the clean facility or laminar flow hood, the sample cassettes must be cleaned of any contamination adhering to the outside surfaces.

c. Preparation of the carbon evaporator. If the polycarbonate filter has already been carbon-coated prior to receipt, the carbon coating step will be omitted, unless the analyst believes the carbon film is too thin. If there is a need to apply more carbon, the filter will be treated in the same way as an uncoated filter. Carbon coating must be performed with a high-vacuum coating unit. Units that are based on evaporation of carbon filaments in a vacuum generated only by an oil rotary pump have not been evaluated for this application, and must not be used. The carbon rods should be sharpened by a carbon rod sharpener to necks of about 4 mm long and 1 mm in diameter. The rods are installed in the evaporator in such a manner that the points are approximately 10 to 12 cm from the surface of a microscope slide held in the rotating and tilting device.

d. Selection of filter area for carbon coating. Before preparation of the filters, a 75 mm x 50 mm microscope slide is washed and dried. This slide is used to support strips of filter during the carbon evaporation. Two parallel strips of double-sided adhesive tape are applied along the length of the slide. Polycarbonate filters are easily stretched during handling, and cutting of areas for further preparation must be performed with great care. The filter and the MCE backing filter are removed together from the cassette and placed on a cleaned glass microscope slide. The filter can be cut with a curved scalpel blade by rocking the blade from the t placed in contact with the filter. process can be repeated to cut a strip approximately 3 mm wide across the diameter of the filter. The strip of polycarbonate filter is separated from the corresponding strip of backing filter and carefully placed so that it bridges the gap between the adhesive tape strips on the microscope slide. The filter strip can be held with fine-point tweezers and supported underneath by the scalpel blade during placement on the microscope slide. The analyst can place several such strips on the same microscope slide, taking care to rinse and wet-wipe the scalpel blade and tweezers before handling a new sample. The filter strips should be identified by etching the glass slide or marking the slide using a marker insoluble in water and solvents. After the filter strip has been cut from each filter, the residual parts of the filter must be returned to the cassette and held in position by reassembly of the cassette. The cassette will then be archived for a period of 30 days or returned to the client upon request.

e. Carbon coating of filter strips. The glass slide holding the filter strips is placed on the rotation-tilting device, and the evaporator chamber is evacuated. The evaporation must be performed in very short bursts, separated by some seconds to allow the electrodes to cool. If evaporation is too rapid, the strips of polycarbonate filter will begin to curl, which will lead to cross-linking of the surface material and make it relatively insoluble in chloroform. An experienced analyst can judge the thickness of carbon film to be applied, and some test should be made first on unused filters. If the film is too thin, large particles will be lost from the TEM specimen, and there will be few complete and undamaged grid openings on the specimen. If the coating is too thick, the filter will tend to curl when exposed to chloroform vapor and the carbon film may not adhere to the support mesh. Too thick a carbon film will also lead to a TEM image that is lacking in contrast, and the ability to obtain ED patterns will be compromised. The carbon film should be as thin as possible and remain intact on most of the grid openings of the TEM specimen intact.

f. Preparation of the Jaffe washer. The precise design of the Jaffe washer is not considered important, so any one of the published designs may be used. A washer consisting of a simple stainless steel bridge is recommended. Several pieces of lens tissue approximately 1.0 cm x 0.5 cm are placed on the stainless steel bridge, and the washer is filled with chloroform to a level where the meniscus contacts the underside of the mesh, which results in saturation of the lens tissue. See References 8 and 10 of Unit III.L.

g. Placing of specimens into the Jaffe washer. The TEM grids are first placed on a piece of lens tissue so that individual grids can be picked up with tweezers. Using a curved scalpel blade, the analyst excises three 3 mm square pieces of the carbon-coated polycarbonate filter from the filter strip. The three squares are selected from the center of the strip and from two points between the outer periphery of the active surface and the center. The piece of filter is placed on a TEM specimen grid with the shiny side of the TEM grid facing upwards, and the whole assembly is placed boldly onto the saturated lens tissue in the Jaffe washer. If carbon-coated grids are used, the filter should be placed carbon-coated side down. The three excised squares of filters are placed on the same piece of lens tissue. Any number of separate pieces of lens tissue may be placed in the same Jaffe washer. The lid is then placed on the Jaffe washer, and the system is allowed to stand for several hours, preferably overnight.

h. Condensation washing. It has been found that many polycarbonate filters will not dissolve completely in the Jaffe washer, even after being exposed to chloroform for as long as 3 days. This problem becomes more serious if the surface of the filter was overheated during the carbon evaporation. The presence of undissolved filter medium on the TEM preparation leads to partial or complete obscuration of areas of the sample, and fibers that may be present in these areas of the specimen will be overlooked; this will lead to a low result. Undissolved filter medium also compromises the ability to obtain ED patterns. Before they are counted, TEM grids must be examined critically to determine whether they are adequately cleared of residual filter medium. It has been found that condensation washing of the grids after the initial Jaffe washer treatment, with chloroform as the solvent, clears all residual filter medium in a period of approximately 1 hour. In practice, the piece of lens tissue supporting the specimen grids is transferred to the cold finger of the condensation washer, and the washer is operated for about 1 hour. If the specimens are cleared satisfactorily by the Jaffe washer alone, the condensation washer step may be unnecessary.

8. TEM specimen preparation from MCE filters.

a. This method of preparing TEM specimens from MCE filters is similar to that specified in NIOSH Method 7402. See References 7, 8, and 9 of Unit III.L.

b. Upon receipt at the analytical laboratory, the sample cassettes must be cleaned of any contamination adhering to the outside surfaces before entering the clean sample preparation area.

c. Remove a section from any quadrant of the sample and blank filters.

d. Place the section on a clean microscope slide. Affix the filter section to the slide with a gummed paged reinforcement or other suitable means. Label the slide with a water and solvent-proof marking pen.

e. Place the slide in a petri dish which contains several paper filters soaked with 2 to 3 mL acetone. Cover the dish. Wait 2 to 4 minutes for the sample filter to fuse and clear.

f. Plasma etching of the collapsed filter is required.

i. The microscope slide to which the collapsed filter pieces are attached is placed in a plasma asher. Because plasma ashers vary greatly in their performance, both from unit to unit and between different positions in the asher chamber, it is difficult to specify the conditions that should be used. This is one area of the method that requires further evaluation. Insufficient etching will result in a failure to expose embedded filters, and too much etching may result in loss of particulate from the surface. As an interim measure, it is recommended that the time for ashing of a known weight of a collapsed filter be established and that the etching rate be calculated in terms of micrometers per second. The actual etching time used for a particular asher and operating conditions will then be set such that a 1–2 μm (10 percent) layer of collapsed surface will be removed.

ii. Place the slide containing the collapsed filters into a low-temperature plasma asher, and etch the filter.

g. Transfer the slide to a rotating stage inside the bell jar of a vacuum evaporator. Evaporate a 1 mm x 5 mm section of graphite rod onto the cleared filter. Remove the slide to a clean, dry, covered petri dish.

h. Prepare a second petri dish as a Jaffe washer with the wicking substrate prepared from filter or lens paper placed on top of a 6 mm thick disk of clean spongy polyurethane foam. Cut a V-notch on the edge of the foam and filter paper. Use the V-notch as a reservoir for adding solvent. The wicking substrate should be thin enough to fit into the petri dish without touching the lid.

i. Place carbon-coated TEM grids face up on the filter or lens paper. Label the grids by marking with a pencil on the filter paper or by putting registration marks on the petri dish lid and marking with a waterproof marker on the dish lid. In a fume hood, fill the dish with acetone until the wicking substrate is saturated. The level of acetone should be just high enough to saturate the filter paper without creating puddles.

j. Remove about a quarter section of the carbon-coated filter samples from the glass slides using a surgical knife and tweezers. Carefully place the section of the filter, carbon side down, on the appropriately labeled grid in the acetone-saturated petri dish. When all filter sections have been transferred, slowly add more solvent to the wedge-shaped trough to bring the acetone level up to the highest possible level without disturbing the sample preparations. Cover the petri dish. Elevate one side of the petri dish by placing a slide under it. This allows drops of condensed solvent vapors to form near the edge rather than in the center where they would drip onto the grid preparation.

G. TEM Method

1. Instrumentation.

a. Use an 80–120 kV TEM capable of performing electron diffraction with a fluorescent screen inscribed with calibrated gradations. If the TEM is equipped with EDXA it must either have a STEM attachment or be capable of producing a spot less than 250 nm in diameter at crossover. The microscope shall be calibrated routinely (see Unit III.J.) for magnification and camera constant.

b. While not required on every microscope in the laboratory, the laboratory must have either one microscope equipped with energy dispersive X-ray analysis or access to an equivalent system on a TEM in another laboratory. This must be an Energy Dispersive X-ray Detector mounted on TEM column and associated hardware/software to collect, save, and read out spectral information. Calibration of Multi-Channel Analyzer shall be checked regularly for A1 at 1.48 KeV and Cu at 8.04 KeV, as well as the manufacturer's procedures.

i. Standard replica grating may be used to determine magnification (e.g., 2160 lines/mm).

ii. Gold standard may be used to determine camera constant.

c. Use a specimen holder with single tilt and/or double tilt capabilities.

2. Procedure.

a. Start a new Count Sheet for each sample to be analyzed. Record on count sheet: analyst's initials and date: lab sample number; client sample number microscope identification; magnification for analysis; number of predetermined grid openings to be analyzed; and grid identification. See the following Figure 4:

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FIGURE 4--COUNT SHEET

Lab Sample No. ____________
Client Sample No. ____________
Instrument I.D. ____________
Magnification ____________
Acc. Voltage ____________

Filter Type ____________
Filter Area ____________
Grid I.D. ____________
Grid Opening (GO) Area ____________
No. GO to be Analyzed ____________

Operator ____________
Date ____________
Comments ____________

GO	Structure No.	Structure Type*	Length		ED Observation				EDAX
			< 5µm	≥ 5 µm	Chrys.	Amph.	Nonasb.	Neg. ID	

GO	Structure No.	Structure Type*	Length		ED Observation				EDAX
			< 5µm	≥ 5 µm	Chrys.	Amph.	Nonasb.	Neg. ID	

*B = Bundle
C = Cluster
F = Fiber
M = Matrix

NFD = No fibers detected
N = No diffraction obtained

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b. Check that the microscope is properly aligned and calibrated according to the manufacturer's specifications and instructions.

c. Microscope settings: 80–120 kV, grid assessment 250–1000X, then 15,000–20,000X screen magnification for analysis.

d. Approximately one-half (0.5) of the predetermined sample area to be analyzed shall be performed on one sample grid preparation and the remaining half on a second sample grid preparation.

e. Determine the suitability of the grid.

i. Individual grid openings with greater than 5 percent openings (holes) or covered with greater than 25 percent particulate matter or obviously having nonuniform loading shall not be analyzed.

ii. Examine the grid at low magnification ($<$1000X) to determine its suitability for detailed study at higher magnifications.

iii. Reject the grid if:

(1) Less than 50 percent of the grid openings covered by the replica are intact.

(2) It is doubled or folded.

(3) It is too dark because of incomplete dissolution of the filter.

iv. If the grid is rejected, load the next sample grid.

v. If the grid is acceptable, continue on to Step 6 if mapping is to be used; otherwise proceed to Step 7.

f. Grid Map (Optional).

i. Set the TEM to the low magnification mode.

ii. Use flat edge or finder grids for mapping.

iii. Index the grid openings (fields) to be counted by marking the acceptable fields for one-half (0.5) of the area needed for analysis on each of the two grids to be analyzed. These may be marked just before examining each grid opening (field), if desired.

iv. Draw in any details which will allow the grid to be properly oriented if it is reloaded into the microscope and a particular field is to be reliably identified.

g. Scan the grid.

i. Select a field to start the examination.

ii. Choose the appropriate magnification (15,000 to 20,000X screen magnification).

iii. Scan the grid as follows.

(1) At the selected magnification, make a series of parallel traverses across the field. On reaching the end of one traverse, move the image one window and reverse the traverse.

Note.—A slight overlap should be used so as not to miss any part of the grid opening (field).

(2) Make parallel traverses until the entire grid opening (field) has been scanned.

h. Identify each structure for appearance and size.

i. Appearance and size: Any continuous grouping of particles in which an asbestos fiber within aspect ratio greater than or equal to 5:1 and a length greater than or equal to 0.5 μm is detected shall be recorded on the count sheet. These will be designated asbestos structures and will be classified as fibers, bundles, clusters, or matrices. Record as individual fibers any contiguous grouping having 0, 1, or 2 definable intersections. Groupings having more than 2 intersections are to be described as cluster or matrix. See the following Figure 5:

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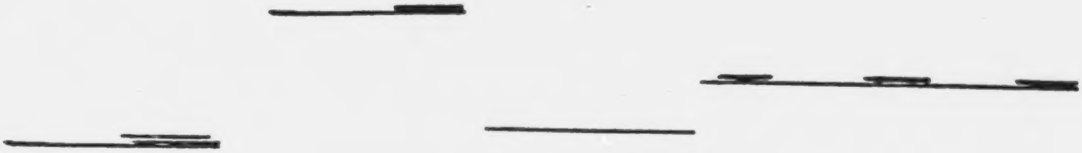
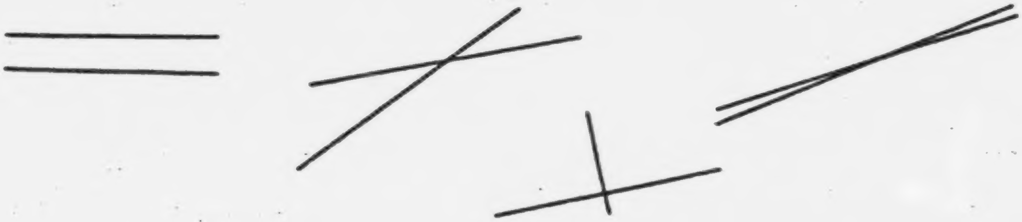
FIGURE 5--COUNTING GUIDELINES USED IN DETERMINING ASBESTOS STRUCTURES

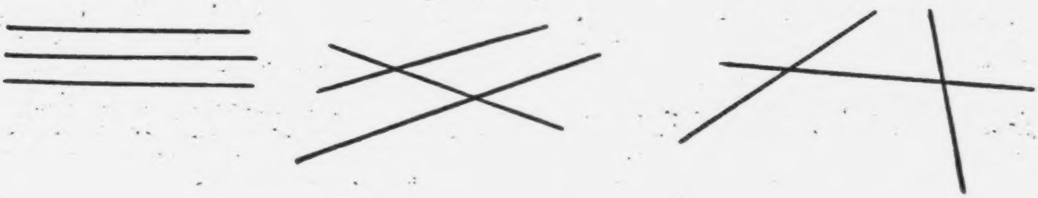
Count as 1 fiber; 1 Structure; no intersections.



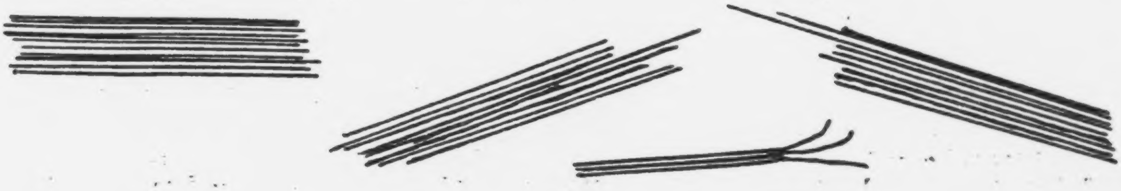
Count as 2 fibers if space between fibers is greater than width of 1 fiber diameter or number of intersections is equal to or less than 1.



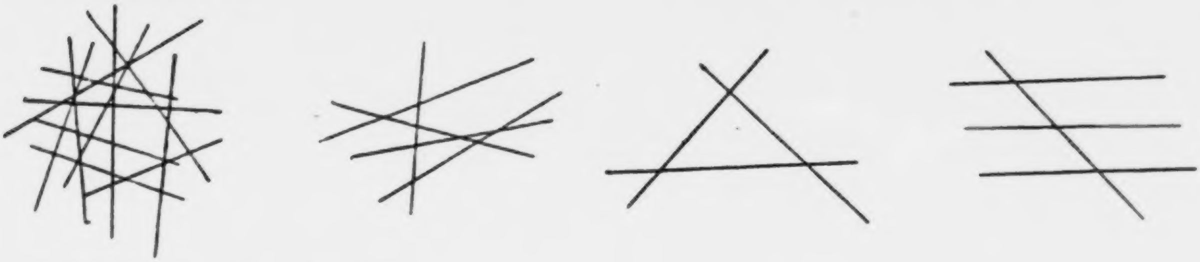
Count as 3 structures if space between fibers is greater than width of 1 fiber diameter or if the number of intersections is equal to or less than 2.



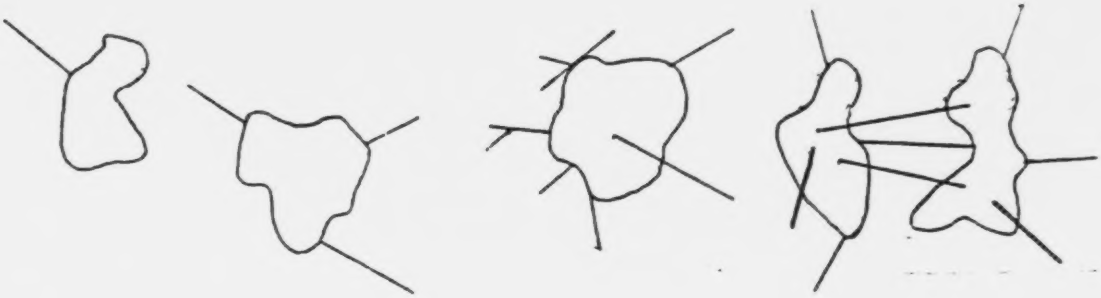
Count bundles as 1 structure; 3 or more parallel fibrils less than 1 fiber diameter separation.



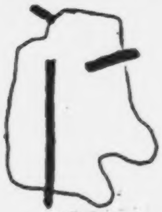
Count clusters as 1 structure; fibers having greater than or equal to 3 intersections.



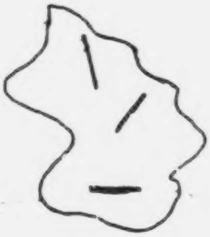
Count matrix as 1 structure.



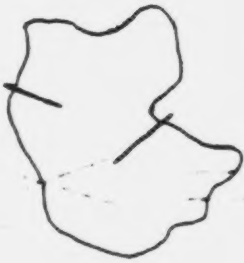
DO NOT COUNT AS STRUCTURES:



Fiber protrusion
<5:1 Aspect Ratio



No fiber protusion



Fiber protrusion
<0.5 micrometer

— <0.5 micrometer in length
▬ <5:1 Aspect Ratio

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An intersection is a non-parallel touching or crossing of fibers, with the projection having an aspect ratio of 5:1 or greater. Combinations such as a matrix and cluster, matrix and bundle, or bundle and cluster are categorized by the dominant fiber quality—cluster, bundle, and matrix, respectively. Separate categories will be maintained for fibers less than 5 μm and for fibers greater than or equal to 5 μm in length. Not required, but useful, may be to record the fiber length in 1 μm intervals. (Identify each structure morphologically and analyze it as it enters the "window".)

(1) *Fiber.* A structure having a minimum length greater than 0.5 μm and an aspect ratio (length to width) of 5:1 or greater and substantially parallel sides. Note the appearance of the end of the fiber, i.e., whether it is flat, rounded or dovetailed, no intersections.

(2) *Bundle.* A structure composed of 3 or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.

(3) *Cluster.* A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group; groupings must have more than 2 intersections.

(4) *Matrix.* Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.

(5) *NSD.* Record NSD when no structures are detected in the field.

(6) *Intersection.* Non-parallel touching or crossing of fibers, with the projection having an aspect ratio 5:1 or greater.

ii. Structure Measurement.

(1) Recognize the structure that is to be sized.

(2) Memorize its location in the "window" relative to the sides, inscribed square and to other particulates in the field so this exact location can be found again when scanning is resumed.

(3) Measure the structure using the scale on the screen.

(4) Record the length category and structure type classification on the count sheet after the field number and fiber number.

(5) Return the fiber to its original location in the window and scan the rest of the field for other fibers; if the direction of travel is not remembered, return to the right side of the field and begin the traverse again.

i. Visual identification of Electron Diffraction (ED) patterns is required for each asbestos structure counted which would cause the analysis to exceed the 70 s/mm^2 concentration. (Generally this means the first four fibers identified as asbestos must exhibit an identifiable diffraction pattern for chrysotile or amphibole.)

i. Center the structure, focus, and obtain an ED pattern. (See Microscope Instruction Manual for more detailed instructions.)

ii. From a visual examination of the ED pattern, obtained with a short camera length, classify the observed structure as belonging to one of the following classifications: chrysotile, amphibole, or nonasbestos.

(1) Chrysotile: The chrysotile asbestos pattern has characteristic streaks on the layer lines other than the central line and some streaking also on the central line. There will be spots of normal sharpness on the central layer line and on alternate lines (2nd, 4th, etc.). The repeat distance between layer lines is 0.53 nm and the center doublet is at 0.73 nm. The pattern should display (002), (110), (130) diffraction maxima; distances and geometry should match a chrysotile pattern and be measured semiquantitatively.

(2) Amphibole Group [includes grunerite (amosite), crocidolite, anthophyllite, tremolite, and actinolite]: Amphibole asbestos fiber patterns show layer lines formed by very closely spaced dots, and the repeat distance between layer lines is also about 0.53 nm. Streaking in layer lines is occasionally present due to crystal structure defects.

(3) Nonasbestos: Incomplete or unobtainable ED patterns, a nonasbestos EDXA, or a nonasbestos morphology.

iii. The micrograph number of the recorded diffraction patterns must be reported to the client and maintained in the laboratory's quality assurance records. The records must also demonstrate that the identification of the pattern has been verified by a qualified individual and that the operator who made the identification is maintaining at least an 80 percent correct visual identification based on his measured patterns. In the event that examination of the pattern by the qualified individual indicates that the pattern had been misidentified visually, the client shall be contacted. If the pattern is a suspected chrysotile, take a photograph of the diffraction pattern at 0 degrees tilt. If the structure is suspected to be amphibole, the sample may have to be tilted to obtain a simple geometric array of spots.

j. Energy Dispersive X-Ray Analysis (EDXA).

i. Required of all amphiboles which would cause the analysis results to exceed the 70 s/mm^2 concentration. (Generally speaking, the first 4 amphiboles would require EDXA.)

ii. Can be used alone to confirm chrysotile after the 70 s/mm^2 concentration has been exceeded.

iii. Can be used alone to confirm all nonasbestos.

iv. Compare spectrum profiles with profiles obtained from asbestos standards. The closest match identifies and categorizes the structure.

v. If the EDXA is used for confirmation, record the properly labeled spectrum on a computer disk, or if a hard copy, file with analysis data.

vi. If the number of fibers in the nonasbestos class would cause the analysis to exceed the 70 s/mm^2 concentration, their identities must be confirmed by EDXA or measurement of a zone axis diffraction pattern to establish that the particles are nonasbestos.

k. Stopping Rules.

i. If more than 50 asbestiform structures are counted in a particular grid opening, the analysis may be terminated.

ii. After having counted 50 asbestiform structures in a minimum of 4 grid openings, the analysis may be terminated. The grid opening in which the 50th fiber was counted must be completed.

iii. For blank samples, the analysis is always continued until 10 grid openings have been analyzed.

iv. In all other samples the analysis shall be continued until an analytical sensitivity of 0.005 s/cm^3 is reached.

l. Recording Rules. The count sheet should contain the following information:

i. Field (grid opening): List field number.

ii. Record "NSD" if no structures are detected.

iii. Structure information.

(1) If fibers, bundles, clusters, and/or matrices are found, list them in consecutive numerical order, starting over with each field.

(2) Length. Record length category of asbestos fibers examined. Indicate if less than 5 μm or greater than or equal to 5 μm.

(3) Structure Type. Positive identification of asbestos fibers is required by the method. At least one diffraction pattern of each fiber type from every five samples must be recorded and compared with a standard diffraction pattern. For each asbestos fiber reported, both a morphological descriptor and an identification descriptor shall be specified on the count sheet.

(4) Fibers classified as chrysotile must be identified by diffraction and/or X-ray analysis and recorded on the count

sheet. X-ray analysis alone can be used as sole identification only after 70s/mm^2 have been exceeded for a particular sample.

(5) Fibers classified as amphiboles must be identified by X-ray analysis and electron diffraction and recorded on the count sheet. (X-ray analysis alone can be used as sole identification only after 70s/mm^2 have been exceeded for a particular sample.)

(6) If a diffraction pattern was recorded on film, the micrograph number must be indicated on the count sheet.

(7) If an electron diffraction was attempted and an appropriate spectra is not observed, N should be recorded on the count sheet.

(8) If an X-ray analysis is attempted but not observed, N should be recorded on the count sheet.

(9) If an X-ray analysis spectrum is stored, the file and disk number must be recorded on the count sheet.

m. Classification Rules.

i. *Fiber.* A structure having a minimum length greater than or equal to 0.5 µm and an aspect ratio (length to width) of 5:1 or greater and substantially parallel sides. Note the appearance of the end of the fiber, i.e., whether it is flat, rounded or dovetailed.

ii. *Bundle.* A structure composed of three or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.

iii. *Cluster.* A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.

iv. *Matrix.* Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.

v. *NSD.* Record NSD when no structures are detected in the field.

n. After all necessary analyses of a particle structure have been completed, return the goniometer stage to 0 degrees, and return the structure to its original location by recall of the original location.

o. Continue scanning until all the structures are identified, classified and sized in the field.

p. Select additional fields (grid openings) at low magnification; scan at a chosen magnification (15,000 to 20,000X screen magnification); and analyze until the stopping rule becomes applicable.

q. Carefully record all data as they are being collected, and check for accuracy.

r. After finishing with a grid, remove it from the microscope, and replace it in the appropriate grid hold. Sample grids must be stored for a minimum of 1 year from the date of the analysis; the sample cassette must be retained for a minimum of 30 days by the laboratory or returned at the client's request.

H. Sample Analytical Sequence

1. Carry out visual inspection of work site prior to air monitoring.

2. Collect a minimum of five air samples inside the work site and five samples outside the work site. The indoor and outdoor samples shall be taken during the same time period.

3. Analyze the abatement area samples according to this protocol. The analysis must meet the 0.005 s/cm^3 analytical sensitivity.

4. Remaining steps in the analytical sequence are contained in Unit IV. of this Appendix.

I. Reporting

The following information must be reported to the client. See the following Table II:

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TABLE II--EXAMPLE LABORATORY LETTERHEAD

Laboratory I.D.	Client I.D.	FILTER MEDIA DATA				Analyzed Area, mm^2	Sample Volume, cc
		Type	Diameter, mm	Effective Area,mm^2	Pore Size, µm		

INDIVIDUAL ANALYTICAL RESULTS

Laboratory I.D.	Client I.D.	# Asbestos Structures	Analytical Sensitivity, s/cc	CONCENTRATION	
				Structures/mm^2	Structures/cc

The analysis was carried out to the approved TEM method. This laboratory is in compliance with the quality specified by the method.

____
Authorized Signature

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1. Concentration in structures per square millimeter and structures per cubic centimeter.
2. Analytical sensitivity used for the analysis.
3. Number of asbestos structures.
4. Area analyzed.
5. Volume of air samples (which was initially provided by client).
6. Average grid size opening.
7. Number of grids analyzed.
8. Copy of the count sheet must be included with the report.
9. Signature of laboratory official to indicate that the laboratory met specifications of the AHERA method.
10. Report form must contain official laboratory identification (e.g., letterhead).
11. Type of asbestos.

J. Calibration Methodology

Note: Appropriate implementation of the method requires a person knowledgeable in electron diffraction and mineral identification by ED and EDXA. Those inexperienced laboratories wishing to develop capabilities may acquire necessary knowledge through analysis of appropriate standards and by following detailed methods as described in References 8 and 10 of Unit III.L.

1. Equipment Calibration. In this method, calibration is required for the air-sampling equipment and the transmission electron microscope (TEM).

a. TEM Magnification. The magnification at the fluorescent screen of the TEM must be calibrated at the grid opening magnification (if used) and also at the magnification used for fiber counting. This is performed with a cross grating replica. A logbook must be maintained, and the dates of calibration depend on the past history of the particular microscope; no frequency is specified. After any maintenance of the microscope that involved adjustment of the power supplied to the lenses or the high-voltage system or the mechanical disassembly of the electron optical column apart from filament exchange, the magnification must be recalibrated. Before the TEM calibration is performed, the analyst must ensure that the cross grating replica is placed at the same distance from the objective lens as the specimens are. For instruments that incorporate an eucentric tilting specimen stage, all speciments and the cross grating replica must be placed at the eucentric position.

b. Determination of the TEM magnification on the fluorescent screen.

i. Define a field of view on the fluorescent screen either by markings or physical boundaries. The field of view must be measurable or previously inscribed with a scale or concentric circles (all scales should be metric).

ii. Insert a diffraction grating replica (for example a grating containing 2,160 lines/mm) into the specimen holder and place into the microscope. Orient the replica so that the grating lines fall perpendicular to the scale on the TEM fluorescent screen. Ensure that the goniometer stage tilt is 0 degrees.

iii. Adjust microscope magnification to 10,000X or 20,000X. Measure the distance (mm) between two widely separated lines on the grating replica. Note the number of spaces between the lines. Take care to measure between the same relative positions on the lines (e.g., between left edges of lines).

Note.—The more spaces included in the measurement, the more accurate the final calculation. On most microscopes, however the magnification is substantially constant only within the central 8–10 cm diameter region of the fluorescent screen.

iv. Calculate the true magnification (M) on the fluorescent screen:

$$M = XC/Y$$

where:

X = total distance (mm) between the designated grating lines;

C = calibration constant of the grating replica (lines/mm):

Y = number of grating replica spaces counted along X.

c. Calibration of the EDXA System. Initially, the EDXA system must be calibrated by using two reference elements to calibrate the energy scale of the instrument. When this has been completed in accordance with the manufacturer's instructions, calibration in terms of the different types of asbestos can proceed. The EDXA detectors vary in both solid angle of detection and in window thickness. Therefore, at a particular accelerating voltage in use on the TEM, the count rate obtained from specific dimensions of fiber will vary both in absolute X-ray count rate and in the relative X-ray peak heights for different elements. Only a few minerals are relevant for asbestos abatement work, and in this procedure the calibration is specified in terms of a "fingerprint" technique. The EDXA spectra must be recorded from individual fibers of the relevant minerals, and identifications are made on the basis of semiquantitative comparisons with these reference spectra.

d. Calibration of Grid Openings.

i. Measure 20 grid openings on each of 20 random 200-mesh copper grids by placing a grid on a glass slide and examining it under the PCM. Use a calibrated graticule to measure the average field diameter and use this number to calculate the field area for an average grid opening. Grids are to be randomly selected from batches up to 1,000.

Note.—A grid opening is considered as one field.

ii. The mean grid opening area must be measured for the type of specimen grids in use. This can be accomplished on the TEM at a properly calibrated low magnification or on an optical microscope at a magnification of approximately 400X by using an eyepiece fitted with a scale that has been calibrated against a stage micrometer. Optical microscopy utilizing manual or automated procedures may be used providing instrument calibration can be verified.

e. Determination of Camera Constant and ED Pattern Analysis.

i. The camera length of the TEM in ED operating mode must be calibrated before ED patterns on unknown samples are observed. This can be achieved by using a carbon-coated grid on which a thin film of gold has been sputtered or evaporated. A thin film of gold is evaporated on the specimen TEM grid to obtain zone-axis ED patterns superimposed with a ring pattern from the polycrystalline gold film.

ii. In practice, it is desirable to optimize the thickness of the gold film so that only one or two sharp rings are obtained on the superimposed ED pattern. Thicker gold film would normally give multiple gold rings, but it will tend to mask weaker diffraction spots from the unknown fibrous particulates. Since the unknown d-spacings of most interest in asbestos analysis are those which lie closest to the transmitted beam, mulitiple gold rings are unnecessary on zone-axis ED patterns. An average camera constant using multiple gold rings can be determined. The camera constant is one-half the diameter, D, of the rings times the interplanar spacing, d, of the ring being measured.

K. Quality Control/Quality Assurance Procedures (Data Quality Indicators)

Monitoring the environment for airborne asbestos requires the use of sensitive sampling and analysis procedures. Because the test is sensitive, it may be influenced by a variety of factors. These include the supplies used in the sampling operation, the performance of the sampling, the preparation of the grid from the filter and the actual examination of this grid in the microscope. Each of these unit operations must produce a product of defined quality if the analytical result is to be a reliable and meaningful test result. Accordingly, a series of control checks and reference standards is performed along with the sample analysis as indicators that the materials used are adequate and the operations are within acceptable limits. In this way, the quality of the data is defined and the results are of known value. These checks and tests also provide timely and specific warning of any problems which might develop within the sampling and analysis operations. A description of these quality control/quality assurance procedures is summarized in the following Table III:

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TABLE III--SUMMARY OF LABORATORY DATA QUALITY OBJECTIVES

Unit Operation	QC Check	Frequency	Conformance Expectation
Sample receiving	Review of receiving report	Each sample	95% complete
Sample custody	Review of chain-of-custody record	Each sample	95% complete
Sample preparation	Supplies and reagents	On receipt	Meet specs. or reject
	Grid opening size	20 openings/20 grids/lot of 1000 or 1 opening/sample	100%
	Special clean area monitoring	After cleaning or service	Meet specs or reclean
	Laboratory blank	1 per prep series or 10%	Meet specs. or reanalyze series
	Plasma etch blank	1 per 20 samples	75%
	Multiple preps (3 per sample)	Each sample	One with cover of 15 complete grid sqs.
Sample analysis	System check	Each day	Each day
	Alignment check	Each day	Each day
	Magnification calibration with low and high standards	Each month or after service	95%
	ED calibration by gold standard	Weekly	95%
	EDS calibration by copper line	Daily	95%
Performance check	Laboratory blank (measure of cleanliness)	Prep 1 per series or 10% read 1 per 25 samples	Meet specs or reanalyze series
	Replicate counting (measure of precision)	1 per 100 samples	1.5 x Poisson Std. Dev.
	Duplicate analysis (measure of reproducibility)	1 per 100 samples	2 x Poisson Std. Dev.
	Known samples of typical materials (working standards)	Training and for comparison with unknowns	100%
	Analysis of NBS SRM 1876 and/or RM 8410 (measure of accuracy and comparability)	1 per analyst per year	1.5 x Poisson Std. Dev.
	Data entry review (data validation and measure of completeness)	Each sample	95%
	Record and verify ID electron diffraction pattern of structure	1 per 5 samples	80% accuracy
Calculations and data reduction	Hand calculation of automated data reduction procedure or independent recalculation of hand-calculated data	1 per 100 samples	85%

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1. When the samples arrive at the laboratory, check the samples and documentation for completeness and requirements before initiating the analysis.

2. Check all laboratory reagents and supplies for acceptable asbestos background levels.

3. Conduct all sample preparation in a clean room environment monitored by laboratory blanks and special testing after cleaning or servicing the room.

4. Prepare multiple grids of each sample.

5. Provide laboratory blanks with each sample batch. Maintain a cumulative average of these results. If this average is greater than 53 f/mm^2 per 10 200-mesh grid openings, check the system for possible sources of contamination.

6. Check for recovery of asbestos from cellulose ester filters submitted to plasma asher.

7. Check for asbestos carryover in the plasma asher by including a blank alongside the positive control sample.

8. Perform a systems check on the transmission electron microscope daily.

9. Make periodic performance checks of magnification, electron diffraction and energy dispersive X-ray systems as set forth in Table III of Unit III.K.

10. Ensure qualified operator performance by evaluation of replicate counting, duplicate analysis, and standard sample comparisons as set forth in Table III of Unit III.K.

11. Validate all data entries.

12. Recalculate a percentage of all computations and automatic data reduction steps as specified in Table III.

13. Record an electron diffraction pattern of one asbestos structure from every five samples that contain asbestos. Verify the identification of the pattern by measurement or comparison of the pattern with patterns collected from standards under the same conditions.

The outline of quality control procedures presented above is viewed as the minimum required to assure that quality data is produced for clearance testing of an asbestos abated area. Additional information may be gained by other control tests. Specifics on those control procedures and options available for environmental testing can be obtained by consulting References 6, 7, and 11 of Unit III.L.

L. References

For additional background information on this method the following references should be consulted.

1. "Guidelines for Controlling Asbestos-Containing Materials in Buildings," EPA 560/5-85-024, June 1985.

2. "Measuring Airborne Asbestos Following an Abatement Action," USEPA/ Office of Toxic Substances, EPA 600/4-85-049, 1985.

3. Small, John and E. Steel. Asbestos Standards: Materials and Analytical Methods. N.B.S. Special Publication 619, 1982.

4. Campbell, W.J., R.L. Blake, L.L. Brown, E.E. Cather, and J.J. Sjoberg. Selected Silicate Minerals and Their Asbestiform Varieties. Information Circular 8751, U.S. Bureau of Mines, 1977.

5. Quality Assurance Handbook for Air Pollution Measurement System. Ambient Air Methods, EPA 600/4-77-027a, USEPA, Office of Research and Development, 1977.

6. Method 2A: Direct Measurement of Gas Volume Through Pipes and Small Ducts. 40 CFR Part 60 Appendix A.

7. Burdette, G.J. Health & Safety Exec., Research & Lab. Services Div. , London, "Proposed Analytical Method for Determination of Asbestos in Air."

8. Chatfield, E.J., Chatfield Tech. Cons., Ltd., Clark, T., PEI Assoc. "Standard Operating Procedure for Determination of Airborne Asbestos Fibers by Transmission Electron Microscopy Using Polycarbonate Membrane Filters." WERL SOP 87-1, March 5, 1987.

9. NIOSH. Method 7402 for Asbestos Fibers, December 11, 1986 Draft.

10. Yamate, G., S.C. Agarwall, R.D. Gibbons, IIT Research Institute, "Methodology for the Measurement of Airborne Asbestos by Electron Microscopy." Draft report, USEPA Contract 68-02-3266, July 1984.

11. Guidance to the Preparation of Quality Assurance Project Plans. USEPA, Office of Toxic Substances, 1984.

IV. Mandatory Interpretation of Transmission Electron Microscopy Results to Determine Completion of Response Actions

A. Introduction

A response action is determined to be completed by TEM when the abatement area has been cleaned and the airborne asbestos concentration inside the abatement area is no higher than concentrations at locations outside the abatement area. "Outside" means outside the abatement area, but not necessarily outside the building. EPA reasons that an asbestos removal contractor cannot be expected to clean an abatement area to an airborne asbestos concentration that is lower than the concentration of air entering the abatement area from outdoors or from other parts of the building. After the abatement area has passed a thorough visual inspection, and before the outer containment barrier is removed, a minimum of five air samples inside the abatement area and a minimum of five air samples outside the abatement area must be collected. Hence, the response action is determined to be completed when the average airborne asbestos concentration measured inside the abatement area is not statistically different from the average airborne asbestos concentration measured outside the abatement area.

The inside and outside concentrations are compared by the Z-test, a statistical test that takes into account the variability in the measurement process. A minimum of five samples inside the abatement area and five samples outside the abatement area are required to control the false negative error rate, i.e., the probability of declaring the removal complete when, in fact, the air concentration inside the abatement area is significantly higher than outside the abatement area. Additional quality control is provided by requiring three blanks (filters through which no air has been drawn) to be analyzed to check for unusually high filter contamination that would distort the test results.

When volumes greater than or equal to 1,199 L for a 25 mm filter and 2,799 L for a 37 mm filter have been collected and the average number of asbestos structures on samples inside the abatement area is no greater than 70 s/mm^2 of filter, the response action may be considered complete without comparing the inside samples to the outside samples. EPA is permitting this initial screening test to save analysis costs in situations where the airborne asbestos concentration is sufficiently low so that it cannot be distinguished from the filter contamination/ background level (fibers deposited on the filter that are unrelated to the air being sampled). The screening test cannot be used when volumes of less than 1,199 L for 25 mm filter or 2,799 L for a 37 mm filter are collected because the ability to distinguish levels significantly different from filter background is reduced at low volumes.

The initial screening test is expressed in structures per square millimeter of filter because filter background levels come from sources other than the air being sampled and cannot be meaningfully expressed as a concentration per cubic centimeter of air. The value of 70 s/mm^2 is based on the experience of the panel of microscopists who consider one structure in 10 grid openings (each grid opening with an area of 0.0057 mm^2) to

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be comparable with contamination/background levels of blank filters. The decision is based, in part, on Poisson statistics which indicate that four structures must be counted on a filter before the fiber count is statistically distinguishable from the count for one structure. As more information on the performance of the method is collected, this criterion may be modified. Since different combinations of the number and size of grid openings are permitted under the TEM protocol, the criterion is expressed in structures per square millimeter of filter to be consistent across all combinations. Four structures per 10 grid openings corresponds to approximately 70 s/mm^2.

B. Sample Collection and Analysis

1. A minimum of 13 samples is required: five samples collected inside the abatement area, five samples collected outside the abatement area, two field blanks, and one sealed blank.

2. Sampling and TEM analysis must be done according to either the mandatory or nonmandatory protocols in Appendix A. At least 0.057 mm^2 of filter must be examined on blank filters.

C. Interpretation of Results

1. The response action shall be considered complete if either:

a. Each sample collected inside the abatement area consists of at least 1,199 L of air for a 25 mm filter, or 2,799 L of air for a 37 mm filter, and the arithmetic mean of their asbestos structure concentrations per square millimeter of filter is less than or equal to 70 s/mm^2; or

b. The three blank samples have an arithmetic mean of the asbestos structure concentration on the blank filters that is less than or equal to 70 s/mm^2 and the average airborne asbestos concentration measured inside the abatement area is not statistically higher than the average airborne asbestos concentration measured outside the abatement area as determined by the Z-test. The Z-test is carried out by calculating

$$Z = \frac{\overline{Y}_I - \overline{Y}_0}{0.8\left(1/n_I + 1/n_0\right)^{1/2}}$$

where $\overline{Y}_I$ is the average of the natural logarithms of the inside samples and $\overline{Y}_0$ is the average of the natural logarithms of the outside samples, n_I is the number of inside samples and n_0 is the number of outside samples. The response action is considered complete if Z is less than or equal to 1.65.

(Note.—When no fibers are counted, the calculated detection limit for that analysis is inserted for the concentration.)

2. If the abatement site does not satisfy either (1) or (2) above, the site must be recleaned and a new set of samples collected.

D. Sequence for Analyzing Samples

It is possible to determine completion of the response action without analyzing all samples. Also, at any point in the process, a decision may be made to terminate the analysis of existing samples, reclean the abatement site, and collect a new set of samples. The following sequence is outlined to minimize the number of analyses needed to reach a decision.

1. Analyze the inside samples.

2. If at least 1,199 L of air for a 25 mm filter or 2,799 L of air for a 37 mm filter is collected for each inside sample and the arithmetic mean concentration of structures per square millimeter of filter is less than or equal to 70 s/mm^2, the response action is complete and no further analysis is needed.

3. If less than 1,199 L of air for a 25 mm filter or 2,799 L of air for a 37 mm filter is collected for any of the inside samples, or the arithmetic mean concentration of structures per square millimeter of filter is greater than 70 s/mm^2, analyze the three blanks.

4. If the arithmetic mean concentration of structures per square millimeter on the blank filters is greater than 70 s/mm^2, terminate the analysis, identify and correct the source of blank contamination, and collect a new set of samples.

5. If the arithmetic mean concentration of structures per square millimeter on the blank filters is less than or equal to 70 s/mm^2, analyze the outside samples and perform the Z-test.

6. If the Z-statistic is less than or equal to 1.65, the response action is complete. If the Z-statistic is greater than 1.65, reclean the abatement site and collect a new set of samples.

Appendix B to Subpart E—Work Practices and Engineering Controls for Small-Scale, Short-Duration Operations Maintenance and Repair (O&M) Activities Involving ACM

This appendix is not mandatory, in that LEAs may choose to comply with all the requirements of 40 CFR 763.121. Section 763.91(b) extends the protection provided by EPA in its 40 CFR 763.121 for worker protection during asbestos abatement projects to employees of local education agencies who perform small-scale, short-duration operations, maintenance and repair (O&M) activities involving asbestos-containing materials and are not covered by the OSHA asbestos construction standard at 29 CFR 1926.58 or an asbestos worker protection standard adopted by a State as part of a State plan approved by OSHA under section 18 of the Occupational Safety and Health Act. Employers wishing to be exempt from the requirements of § 763.121 (e)(6) and (f)(2)(i) may instead comply with the provisions of this appendix when performing small-scale, short-duration O&M activities.

Definition of Small-Scale, Short-Duration Activities

For the purposes of this appendix, small-scale, short-duration maintenance activities are tasks such as, but not limited to:

1. Removal of asbestos-containing insulation on pipes.

2. Removal of small quantities of asbestos-containing insulation on beams or above ceilings.

3. Replacement of an asbestos-containing gasket on a valve.

4. Installation or removal of a small section of drywall.

5. Installation of electrical conduits through or proximate to asbestos-containing materials.

Small-scale, short-duration maintenance activities can be further defined, for the purposes of this subpart, by the following considerations:

1. Removal of small quantities of asbestos-containing materials (ACM) only if required in the performance of another maintenance activity not intended as asbestos abatement.

2. Removal of asbestos-containing thermal system insulation not to exceed amounts greater than those which can be contained in a single glove bag.

3. Minor repairs to damaged thermal system insulation which do not require removal.

4. Repairs to a piece of asbestos-containing wallboard.

5. Repairs, involving encapsulation, enclosure or removal, to small amounts of friable asbestos-containing material only if required in the performance of emergency or routine maintenance activity and not intended solely as asbestos abatement. Such work may not exceed amounts greater than those which can be contained in a single prefabricated minienclosure. Such an enclosure shall conform spatially and geometrically to the localized work area, in order to perform its intended containment function.

OSHA concluded that the use of certain engineering and work practice controls is capable of reducing employee exposures to asbestos to levels below the final standard's action level (0.1 f/cm^3). (See 51 FR 22714, June 20, 1986.) Several controls and work practices, used either singly or in combination, can be employed effectively to reduce asbestos exposures during small maintenance and renovation operations. These include:

1. Wet methods.
2. Removal methods.
    i. Use of glove bags.
    ii. Removal of entire asbestos insulated pipes or structures.
    iii. Use of minienclosures.
3. Enclosure of asbestos materials.
4. Maintenance programs.

This appendix describes these controls and work practices in detail.

Preparation of the Area Before Renovation or Maintenance Activities

The first step in preparing to perform a small-scale, short-duration asbestos renovation or maintenance task, regardless of the abatement method that will be used, is the removal from the work area of all objects that are movable to protect them from asbestos contamination. Objects that cannot be removed must be covered completely with 6-mil-thick polyethylene plastic sheeting before the task begins. If objects have already been contaminated, they should be thoroughly cleaned with a High Efficiency Particulate Air (HEPA) filtered vacuum or be wet-wiped before they are removed from the work area or completely encased in the plastic.

Wet methods. Whenever feasible, and regardless of the abatement method to be used (e.g., removal, enclosure, use of glove bags), wet methods must be used during small-scale, short-duration maintenance and renovation activities that involve disturbing asbestos-containing materials. Handling asbestos materials wet is one of the most reliable methods of ensuring that asbestos fibers do not become airborne, and this practice should therefore be used whenever feasible. Wet methods can be used in the great majority of workplace situations. Only in cases where asbestos work must be performed on live electrical equipment, on live steam lines, or in other areas where water will seriously damage materials or equipment may dry removal be performed. Amended water or another wetting agent should be applied by means of an airless sprayer to minimize the extent to which the asbestos-containing material is disturbed.

Asbestos-containing material should be wetted from the initiation of the maintenance or renovation operation and wetting agents should be used continually throughout the work period to ensure that any dry asbestos-containing material exposed in the course of the work is wet and remains wet until final disposal.

Removal of small amount of asbestos-containing materials. Several methods can be used to remove small amounts of asbestos-containing materials during small-scale, short-duration renovation or maintenance tasks. These include the use of glove bags, the removal of an entire asbestos-covered pipe or structure, and the construction of minienclosures. The procedures that employers must use for each of these operations if they wish to avail themselves of the rule's exemptions are described in the following sections.

Glove bags. OSHA found that the use of glove bags to enclose the work area during small-scale, short-duration maintenance or renovation activities will result in employee exposure to asbestos that are below the rule's action level of 0.1 f/cm^3. This appendix provides requirements for glove-bag procedures to be followed by employers wishing to avail themselves of the rule's exemption for each activity. OSHA has determined that the use of these procedures will reduce the 8-hour time weighted average (TWA) exposure of employees involved in these work operations to levels below the action level and will thus provide a degree of employee protection equivalent to that provided by compliance with all provisions of the rule.

Glove bag installation. Glove bags are approximately 40-inch-wide times 64-inch-long bags fitted with arms through which the work can be performed. When properly installed and used, they permit workers to remain completely isolated from the asbestos material removed or replaced inside the bag. Glove bags can thus provide a flexible, easily installed, and quickly dismantled temporary small work area enclosure that is ideal for small-scale asbestos renovation or maintenance jobs. These bags are single-use control devices that are disposed of at the end of each job. The bags are made of transparent 6-mil-thick polyethylene plastic with areas of Tyvek[1] material (the same material used to make the disposal protective suits used in major asbestos removal, renovation, and demolition operations and in protective gloves). Glove bags are readily available from safety supply stores or specialty asbestos removal supply houses. Glove bags come pre-labelled with the asbestos warning label prescribed by OSHA and EPA for bags used to dispose of asbestos waste.

Glove bag equipment and supplies. Supplies and materials that are necessary to use glove bags effectively include:

1. Tape to seal glove bag to the area from which asbestos is to be removed.
2. Amended water or other wetting agents.
3. An airless sprayer for the application of the wetting agent.
4. Bridging encapsulant (a paste-like substance for coating asbestos) to seal the rough edges of any asbestos-containing materials that remain within the glove bag at the points of attachment after the rest of the asbestos has been removed.
5. Tools such as razor knives, nips, and wire brushes (or other tools suitable for cutting wires, etc.).
6. A HEPA filter-equipped vacuum for evacuating the glove bag (to minimize the release of asbestos fibers) during removal of the bag from the work area and for cleaning any material that may have escaped during the installation of the glove bag.
7. HEPA-equipped dual-cartridge or more protective respirators for use by the employees involved in the removal of asbestos with the glove bag.

Glove bag work practices. The proper use of glove bags requires the following steps:

1. Glove bags must be installed so that they completely cover the pipe or other structure where asbestos work is to be done. Glove bags are installed by cutting the sides of the glove bag to fit the size of the pipe from which asbestos is to be removed. The glove bag is attached to the pipe by folding the open edges together and securely sealing them with tape. All openings in the glove bag must be sealed with duct tape or equivalent material. The bottom seam of the glove bag must also be sealed with duct tape or equivalent to prevent any leakage from the bag that may result from a defect in the bottom seam.

2. The employee who is performing the asbestos removal with the glove bag must don at least a half mask dual-cartridge HEPA-equipped respirator; respirators should be worn by employees who are in close contact with the glove bag and who may thus be exposed as a result of small gaps in the

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[1] Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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seams of the bag or holes punched through the bag by a razor knife or a piece of wire mesh.

3. The removed asbestos material from the pipe or other surface that has fallen into the enclosed bag must be thoroughly wetted with a wetting agent (applied with an airless sprayer through the precut port provided in most gloves bags or applied through a small hole in the bag).

4. Once the asbestos material has been thoroughly wetted, it can be removed from the pipe, beam, or other surface. The choice of tool to use to remove the asbestos-containing material depends on the type of material to be removed. Asbestos-containing materials are generally covered with painted canvas and/or wire mesh. Painted canvas can be cut with a razor knife and peeled away from the asbestos-containing material underneath. Once the canvas has been peeled away, the asbestos-containing material underneath may be dry, in which case it should be resprayed with a wetting agent to ensure that it generates as little dust as possible when removed. If the asbestos-containing material is covered with wire mesh, the mesh should be cut with nips, tin snips, or other appropriate tool and removed.

A wetting agent must then be used to spray any layer of dry material that is exposed beneath the mesh, the surface of the stripped underlying structure, and the inside of the glove bag.

5. After removal of the layer of asbestos-containing material, the pipe or surface from which asbestos has been removed must be thoroughly cleaned with a wire brush and wet-wiped with a wetting agent until no traces of the asbestos-containing material can be seen.

6. Any asbestos-containing insulation edges that have been exposed as a result of the removal or maintenance activity must be encapsulated with bridging encapsulant to ensure that the edges do not release asbestos fibers to the atmosphere after the glove bag has been removed.

7. When the asbestos removal and encapsulation have been completed, a vacuum hose from a HEPA filtered vacuum must be inserted into the glove bag through the port to remove any air in the bag that may contain asbestos fibers. When the air has been removed from the bag, the bag should be squeezed tightly (as close to the top as possible), twisted, and sealed with tape, to keep the asbestos materials safely in the bottom of the bag. The HEPA vacuum can then be removed from the bag and the glove bag itself can be removed from the work area to be disposed of properly.

Minienclosures. In some instances, such as removal of asbestos from a small ventilation system or from a short length of duct, a glove bag may not be either large enough or of the proper shape to enclose the work area. In such cases, a minienclosure can be built around the area where small-scale, short-duration asbestos maintenance or renovation work is to be performed. Such enclosures should be constructed of 6-mil-thick polyethylene plastic sheeting and can be small enough to restrict entry to the asbestos work area to one worker.

For example, a minienclosure can be built in a small utility closet when asbestos-containing duct covering is to be removed. The enclosure is constructed by:

1. Affixing plastic sheeting to the walls with spray adhesive and tape.

2. Covering the floor with plastic and sealing the plastic covering the floor to the plastic on the walls.

3. Sealing any penetrations such as pipes or electrical conducts with tape.

4. Constructing a small change room (approximately 3 feet square) made of 6-mil-thick polyethylene plastic supported by 2-inch by 4-inch lumber (the plastic should be attached to the lumber supports with staples or spray adhesive and tape).

The change room should be contiguous to the minienclosure, and is necessary to allow the worker to vacuum off his protective coveralls and remove them before leaving the work area. While inside minienclosure, the worker should wear Tyvek[1] disposable coveralls and use the appropriate HEPA-filtered dual-cartridge or more protective respiratory protection.

The advantages of minienclosures are that they limit the spread of asbestos contamination, reduce the potential exposure of bystanders and other workers who may be working in adjacent areas, and are quick and easy to install. The disadvantage of minienclosures is that they may be too small to contain the equipment necessary to create a negative pressure within the enclosure; however the double layer of plastic sheeting will serve to restrict the release of asbestos fibers to the area outside the enclosure.

Removal of entire structures. When pipes are insulated with asbestos-containing materials, removal of the entire pipe may be more protective, easier, and more cost-effective than stripping the asbestos insulation from the pipe. Before such a pipe is cut, the asbestos-containing insulation must be wrapped with 6-mil polyethylene plastic and securely sealed with duct tape or equivalent. This plastic covering will prevent asbestos fibers from becoming airborne as a result of the vibration created by the power saws used to cut the pipe. If possible, the pipes should be cut at locations that are not insulated to avoid disturbing the asbestos. If a pipe is completely insulated with asbestos-containing materials, small sections should be stripped using the glove-bag method described above before the pipe is cut at the stripped sections.

Enclosure. The decision to enclose rather than remove asbestos-containing material from an area depends on the building owner's preference, i.e., for removal or containment. Owners consider such factors as cost effectiveness, the physical configuration of the work area, and the amount of traffic in the area when determining which abatement method to use.

If the owner chooses to enclose the structure rather than to remove the asbestos-containing material insulating it, a solid structure (airtight walls and ceilings) must be built around the asbestos covered pipe or structure to prevent the release of asbestos-containing materials into the area beyond the enclosure and to prevent disturbing these materials by casual contact during future maintenance operations.

Such a permanent (i.e., for the life of the building) enclosure should be built of new construction materials and should be impact resistant and airtight. Enclosure walls should be made of tongue-and-groove boards, boards with spine joints, or gypsum boards having taped seams. The underlying structure must be able to support the weight of the enclosure. (Suspended ceilings with laid-in panels do not provide airtight enclosures and should not be used to enclose structures covered with asbestos-containing materials.) All joints between the walls and ceiling of the enclosure should be caulked to prevent the escape of asbestos fibers. During the installation of enclosures, tools that are used (such as drills or rivet tools) should be equipped with HEPA-filtered vacuums. Before constructing the enclosure, all electrical conduits, telephone lines, recessed lights, and pipes in the area to be enclosed should be moved to ensure that the enclosure will not have to be re-opened later for routine or emergency maintenance. If such lights or other equipment cannot be moved to a new location for logistic reasons, or if moving them will disturb the asbestos-containing materials, removal rather than enclosure of the asbestos-containing materials is the appropriate control method to use.

Maintenance program. An asbestos maintenance program must be initiated in all facilities that have friable asbestos-containing materials. Such a program should include:

1. Development of an inventory of all asbestos-containing materials in the facility.
2. Periodic examination of all asbestos-containing materials to detect deterioration.
3. Written procedures for handling asbestos materials during the performance of small-scale, short-duration maintenance and renovation activities.
4. Written procedures for asbestos disposal.
5. Written procedures for dealing with asbestos-related emergencies.

Members of the building's maintenance engineering staff (electricians, heating/air conditioning engineers, plumbers, etc.) who may be required to handle asbestos-containing materials should be trained in safe procedures. Such training should include at a minimum:

1. Information regarding types of ACM and its various uses and forms.
2. Information on the health effects associated with asbestos exposure.
3. Descriptions of the proper methods of handling asbestos-containing materials.
4. Information on the use of HEPA-equipped dual-cartridge respirators and other personal protection during maintenance activities.

Prohibited activities. The training program for the maintenance engineering staff should describe methods of handling asbestos-containing materials as well as routine maintenance activities that are prohibited when asbestos-containing materials are involved. For example, maintenance staff employees should be instructed:

1. *Not* to drill holes in asbestos-containing materials.
2. *Not* to hang plants or pictures on structures covered with asbestos-containing materials.
3. *Not* to sand asbestos-containing floor tile.
4. *Not* to damage asbestos-containing materials while moving furniture or other objects.
5. *Not* to install curtains, drapes, or dividers in such a way that they damage asbestos-containing materials.
6. *Not* to dust floors, ceilings, moldings or other surfaces in asbestos-contaminated environments with a dry brush or sweep with a dry broom.
7. *Not* to use an ordinary vacuum to clean up asbestos-containing debris.
8. *Not* to remove ceiling tiles below asbestos-containing materials without wearing the proper respiratory protection, clearing the area of other people, and observing asbestos removal waste disposal procedures.
9. *Not* to remove ventilation system filters dry.
10. *Not* to shake ventilation system filters.

Appendix D to Subpart E—Transport and Disposal of Asbestos Waste

For the purposes of this appendix, transport is defined as all activities from receipt of the containerized asbestos waste at the generation site until it has been unloaded at the disposal site. Current EPA regulations state that there must be no visible emissions to the outside air during waste transport. However, recognizing the potential hazards and subsequent liabilities associated with exposure, the following additional precautions are recommended.

Recordkeeping. Before accepting wastes, a transporter should determine if the waste is properly wetted and containerized. The transporter should then require a chain-of-custody form signed by the generator. A chain-of-custody form may include the name and address of the generator, the name and address of the pickup site, the estimated quantity of asbestos waste, types of containers used, and the destination of the waste. The chain-of-custody form should then be signed over to a disposal site operator to transfer responsibility for the asbestos waste. A copy of the form signed by the disposal site operator should be maintained by the transporter as evidence of receipt at the disposal site.

Waste handling. A transporter should ensure that the asbestos waste is properly contained in leak-tight containers with appropriate labels, and that the outside surfaces of the containers are not contaminated with asbestos debris adhering to the containers. If there is reason to believe that the condition of the asbestos waste may allow significant fiber release, the transporter should not accept the waste. Improper containerization of wastes is a violation of the NESHAPs regulation and should be reported to the appropriate EPA Regional Asbestos NESHAPs contact below:

Region I

Asbestos NESHAPs Contact, Air Management Division, USEPA, Region I, JFK Federal Building, Boston, MA 02203, (617) 223–3266.

Region II

Asbestos NESHAPs Contact, Air & Waste Management Division, USEPA, Region II, 26 Federal Plaza, New York, NY 10007, (212) 264–6770.

Region III

Asbestos NESHAPs Contact, Air Management Division, USEPA, Region III, 841 Chestnut Street, Philadelphia, PA 19107, (215) 597–9325.

Region IV

Asbestos NESHAPs Contact, Air, Pesticide & Toxic Management, USEPA, Region IV, 345 Courtland Street, NE., Atlanta, GA 30365, (404) 347–4298.

Region V

Asbestos NESHAPs Contact, Air Management Division, USEPA, Region V, 230 S. Dearborn Street, Chicago, IL 60604, (312) 353–6793.

Region VI

Asbestos NESHAPs Contact, Air & Waste Management Division, USEPA, Region VI, 1445 Ross Avenue, Dallas, TX 75202, (214) 655–7229.

Region VII

Asbestos NESHAPs Contact, Air & Waste Management Division, USEPA, Region VII, 726 Minnesota Avenue, Kansas City, KS 66101, (913) 236–2896.

Region VIII

Asbestos NESHAPs Contact, Air & Waste Management Division, USEPA, Region VIII, 999 18th Street, Suite 500, Denver, CO 80202, (303) 293–1814.

Region IX

Asbestos NESHAPs Contact, Air Management Division, USEPA, Region IX, 215 Fremont Street, San Francisco, CA 94105, (415) 974–7633.

Region X

Asbestos NESHAPs Contact, Air & Toxics Management Division, USEPA, Region X, 1200 Sixth Avenue, Seattle, WA 98101, (206) 442–2724.

Once the transporter is satisfied with the condition of the asbestos waste and agrees to handle it, the containers should be loaded into the transport vehicle in a careful manner to prevent breaking of the containers. Similarly, at the disposal site, the asbestos waste containers should be transferred carefully to avoid fiber release.

Waste transport. Although there are no regulatory specifications regarding the transport vehicle, it is recommended that vehicles used for transport of containerized asbestos waste have an enclosed carrying compartment or

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utilize a canvas covering sufficient to contain the transported waste, prevent damage to containers, and prevent fiber release. Transport of large quantities of asbestos waste is commonly conducted in a 20-cubic-yard "roll off" box, which should also be covered. Vehicles that use compactors to reduce waste volume should not be used because these will cause the waste containers to rupture. Vacuum trucks used to transport waste slurry must be inspected to ensure that water is not leaking from the truck.

Disposal involves the isolation of asbestos waste material in order to prevent fiber release to air or water. Landfilling is recommended as an environmentally sound isolation method because asbestos fibers are virtually immobile in soil. Other disposal techniques such as incineration or chemical treatment are not feasible due to the unique properties of asbestos. EPA has established asbestos disposal requirements for active and inactive disposal sites under NESHAPs (40 CFR Part 61, Subpart M) and specifies general requirements for solid waste disposal under RCRA (40 CFR Part 257). Advance EPA notification of the intended disposal site is required by NESHAPs.

Selecting a disposal facility. An acceptable disposal facility for asbestos wastes must adhere to EPA's requirements of no visible emissions to the air during disposal, or minimizing emissions by covering the waste within 24 hours. The minimum required cover is 6 inches of nonasbestos material, normally soil, or a dust-suppressing chemical. In addition to these federal requirements, many state or local government agencies require more stringent handling procedures. These agencies usually supply a list of "approved" or licensed asbestos disposal sites upon request. Solid waste control agencies are listed in local telephone directories under state, county, or city headings. A list of state solid waste agencies may be obtained by calling the RCRA hotline: 1–800–424–9346 (382–3000 in Washington, DC). Some landfill owners or operators place special requirements on asbestos waste, such as placing all bagged waste into 55-gallon metal drums. Therefore, asbestos removal contractors should contact the intended landfill before arriving with the waste.

Receiving asbestos waste. A landfill approved for receipt of asbestos waste should require notification by the waste hauler that the load contains asbestos. The landfill operator should inspect the loads to verify that asbestos waste is properly contained in leak-tight containers and labeled appropriately. The appropriate EPA Regional Asbestos NESHAPs Contact should be notified if the landfill operator believes that the asbestos waste is in a condition that may cause significant fiber release during disposal. In situations when the wastes are not properly containerized, the landfill operator should thoroughly soak the asbestos with a water spray prior to unloading, rinse out the truck, and immediately cover the wastes with nonasbestos material prior to compacting the waste in the landfill.

Waste deposition and covering. Recognizing the health dangers associated with asbestos exposure, the following procedures are recommended to augment current federal requirements:

- Designate a separate area for asbestos waste disposal. Provide a record for future landowners that asbestos waste has been buried there and that it would be hazardous to attempt to excavate that area. (Future regulations may require property deeds to identify the location of any asbestos wastes and warn against excavation.)
- Prepare a separate trench to receive asbestos wastes. The size of the trench will depend upon the quantity and frequency of asbestos waste delivered to the disposal site. The trenching technique allows application of soil cover without disturbing the asbestos waste containers. The trench should be ramped to allow the transport vehicle to back into it, and the trench should be as narrow as possible to reduce the amount of cover required. If possible, the trench should be aligned perpendicular to prevailing winds.
- Place the asbestos waste containers into the trench carefully to avoid breaking them. Be particularly careful with plastic bags because when they break under pressure asbestos particles can be emitted.
- Completely cover the containerized waste within 24 hours with a minimum of 6 inches of nonasbestos material. Improperly containerized waste is a violation of the NESHAPs and EPA should be notified.

However, if improperly containerized waste is received at the disposal site, it should be covered immediately after unloading. Only after the wastes, including properly containerized wastes, are completely covered, can the wastes be compacted or other heavy equipment run over it. During compacting, avoid exposing wastes to the air or tracking asbestos material away from the trench.

- For final closure of an area containing asbestos waste, cover with at least an additional 30 inches of compacted nonasbestos material to provide a 36-inch final cover. To control erosion of the final cover, it should be properly graded and vegetated. In areas of the United States where excessive soil erosion may occur or the frost line exceeds 3 feet, additional final cover is recommended. In desert areas where vegetation would be difficult to maintain, 3–6 inches of well graded crushed rock is recommended for placement on top of the final cover.

Controlling public access. Under the current NESHAPs regulation, EPA does not require that a landfill used for asbestos disposal use warning signs or fencing if it meets the requirement to cover asbestos wastes. However, under RCRA, EPA requires that access be controlled to prevent exposure of the public to potential health and safety hazards at the disposal site. Therefore, for liability protection of operators of landfills that handle asbestos, fencing and warning signs are recommended to control public access when natural barriers do not exist. Access to a landfill should be limited to one or two entrances with gates that can be locked when left unattended. Fencing should be installed around the perimeter of the disposal site in a manner adequate to deter access by the general public. Chain-link fencing, 6-ft high and topped with a barbed wire guard, should be used. More specific fencing requirements may be specified by local regulations. Warning signs should be displayed at all entrances and at intervals of 330 feet or less along the property line of the landfill or perimeter of the sections where asbestos waste is deposited. The sign should read as follows:

ASBESTOS WASTE DISPOSAL SITE

BREATHING ASBESTOS DUST MAY
CAUSE LUNG DISEASE AND CANCER

Recordkeeping. For protection from liability, and considering possible future requirements for notification on disposal site deeds, a landfill owner should maintain documentation of the specific location and quantity of the buried asbestos wastes. In addition, the estimated depth of the waste below the surface should be recorded whenever a landfill section is closed. As mentioned previously, such information should be recorded in the land deed or other record along with a notice warning against excavation of the area.

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ENVIRONMENTAL PROTECTION AGENCY

[OPTS-62055; FRL-3269-8]

Asbestos-Containing Materials in Schools; EPA Approved Courses Under the Asbestos Hazard Emergency Response Act (AHERA)

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: In section 206(c)(3) of Title II, the Administrator, in consultation with affected organizations, was directed to publish (and revise as necessary) a list of asbestos courses and tests in effect before the date of enactment of this title which qualify for equivalency treatment for interim accreditation purposes and a list of asbestos courses and tests which the Administrator determines are consistent with the Model Plan and which will qualify a contractor for accreditation. This Federal Register notice includes the initial list of course approvals. In addition, the list includes State accreditation programs that EPA has approved as meeting the requirements of the Model Plan.

FOR FURTHER INFORMATION CONTACT: Edward A. Klein, Director, TSCA Assistance Office (TS-799), Office of Toxic Substances, Environmental Protection Agency, Rm. E-543, 401 M St., SW., Washington, DC 20460, Telephone: (202) 554-1404.

SUPPLEMENTARY INFORMATION: Section 206 of Title II of the Toxic Substances Control Act (TSCA), 15 U.S.C. 2646, required EPA to develop by April 20, 1987 a Model Contractor Accreditation Plan. The Plan was issued on April 20, and was published in the Federal Register of April 30, 1987, as Appendix C to Subpart E, 40 CFR Part 763.

To conduct asbestos-related work in schools, persons must receive accreditation in order to inspect school buildings for asbestos, develop management plans, and design or conduct response actions. Such persons can be accredited by States, which are required to adopt contractor accreditation plans at least as stringent as the EPA Model Plan, or by completing an EPA-approved training course and passing an examination for such course. The EPA Model Contractor Accreditation Plan establishes those areas of knowledge of asbestos inspection, management plan development, and response action technology that persons seeking accreditation must demonstrate and States must include in their accreditation programs.

Elsewhere in this issue of the Federal Register EPA is promulgating a final "Asbestos-Containing Materials In Schools" rule (40 CFR Part 763, Subpart E) which requires all local education agencies (LEAs) to identify asbestos-containing materials (ACM) in their school buildings and take appropriate actions to control the release of asbestos fibers. The LEAs are also required to describe their activities in management plans, which must be made available to the public and submitted to State governors. Under Title II, LEAs are required to use specially-trained persons to conduct inspections for asbestos, develop the management plans, and design or conduct major actions to control asbestos.

The length of initial training courses for accreditation under the Model Plan varies by discipline. Briefly, inspectors must take a 3-day training course; management planners must take the inspection course plus an additional 2 days devoted to management planning; and abatement project designers are required to have at least 3 days of training. In addition, asbestos abatement contractors and supervisors must take a 4-day training course and asbestos abatement workers are required to take a 3-day training course. For all disciplines, persons seeking accreditation must also pass an examination and participate in annual re-training courses. A complete description of accreditation requirements can be found in the Model Accreditation Plan at 40 CFR Part 763, Subpart E, Appendix C.I.1.A. through E.

In section 206(c)(3) of Title II, the Administrator, in consultation with affected organizations, was directed to publish (and revise as necessary) a list of asbestos courses and tests in effect before the date of enactment of this title which qualify for equivalency treatment for interim accreditation purposes and a list of asbestos courses and tests which the Administrator determines are consistent with the Model Plan and which will qualify a contractor for accreditation. This Federal Register notice includes the initial list of course approvals. In addition, the list includes State accreditation programs that EPA has approved as meeting the requirements of the Model Plan.

Three types of EPA approvals are included in this Federal Register notice. Unit I discusses EPA approval of State accreditation programs. Unit II covers EPA approval of training courses. Unit III discusses EPA aporoval of training courses for interim accreditation. Lastly, Unit IV provides the list of State accreditation programs and training courses approved by EPA as of October 1987. Subsequent Federal Register notices will add other State programs and training courses to this initial list.

I. EPA Approval of State Accreditation Programs

As discussed in the Model Plan, EPA will approve State accreditation programs that the Agency determines are at least as stringent as the Model Plan. In addition, the Agency is able to approve individual disciplines within a State's accreditation program. For example, a State that currently only has an accreditation requirement for inspectors can receive EPA approval for that discipline immediately rather than waiting to develop accreditation requirements for all disciplines in the Model Plan before seeking EPA approval.

As listed in Unit IV, New Jersey has received EPA approval for two accreditation disciplines. Any training courses in these two disciplines approved by New Jersey are EPA-approved courses for purposes of accreditation. These training courses are EPA-approved courses for purposes of TSCA Title II in New Jersey and in all States without an EPA-approved accreditation program for that discipline. For a current list of courses approved by New Jersey, interested parties should contact the State agency listed under Unit IV. EPA plans to include the training courses approved by New Jersey in the next Federal Register notice listing EPA-approved courses.

The State of Kansas currently has a training program for asbestos abatement contractors and supervisors that does not meet all of the Model Plan's requirements for this discipline. However, the Kansas program's training course requirements do meet the requirements for EPA approval of training courses for interim accreditation (see Unit III). As a result, persons who have met the training and exam requirements of the Kansas abatement contractor and supervisor program are accredited as listed under Unit IV on an interim basis. The Kansas contractor and supervisor accreditation program still must be upgraded within the time period specified in TSCA Title II to be at least as stringent as the Model Plan.

II. EPA Approval of Training Courses

Training courses approved by EPA are listed under Unit IV. The examinations for these approved courses under Unit IV have also been approved by EPA. EPA has three categories of course approval: full, contingent, and approved for interim accreditation. Courses approved for interim accreditation will be discussed in Unit III.

Full approval means EPA has reviewed and found acceptable the course's written submission seeking EPA approval and has conducted an on-site audit and determined that the training course meets or exceeds the Model Plan's training requirements for the relevant discipine.

Contingent approval means the Agency has reviewed the course's written submission seeking EPA approval and found the materials to be acceptable (i.e. the written course materials meet the Model Plan's training course requirements). However, EPA has not yet conducted an on-site audit.

Successful completion of either a fully approved course or a contingently approved course provides full accreditation for course attendees. If EPA subsequently audits a contingently approved course and withdraws approval due to deficiencies discovered during the audit, future course offerings would no longer have EPA approval. However, withdrawal of EPA approval would not effect the accreditation of persons who took previously offered training courses including the course audited by EPA.

EPA-approved training courses listed under Unit IV are approved on a national basis. EPA has organized Unit IV by EPA Region to assist the public in locating those training courses that are offered nearby.

EPA-approved State accreditation programs have the authority to have more stringent accreditation requirements than the Model Plan. As a result, some EPA-approved training courses listed under Unit IV may not meet the requirements of a particular State's accreditation program. Sponsors of training courses and persons who have received accreditation or are seeking accreditation should contact individual States to check on accreditation requirements.

A number of training courses offered by several universities before EPA issued the Model Plan equaled or exceeded the subsequently issued Model Plan's training course requirements. These courses are listed under Unit IV as being fully approved. It should be noted that persons who successfully completed these courses are fully accredited; they are not limited only to being interimly accredited.

III. EPA Approval of Training Courses for Interim Accreditation

TSCA Title II enables EPA to permit persons to be accredited on an interim basis if they have attended previous EPA-approved asbestos training and have passed (or pass) an asbestos exam. As a result, the Agency is approving training courses offered previously for purposes of accrediting persons on an interim basis. Only those persons who have taken training courses since January 1, 1985 will be considered under these interim accreditation provisions. In addition, EPA will not grant interim accreditation to any person who takes an equivalent training course after the date the asbestos-in-schools rule takes effect. This accreditation is interim since the person shall be considered accredited for only 1 year after the date on which the State where the person is employed establishes an accreditation program at least as stringent as the EPA Model Plan. If the State does not adopt an accreditation program within the time period required by Title II, persons with interim accreditation must become fully accredited within 1 year after the date the State was required to have established a program.

For purposes of the Model Plan, an equivalent training course is one that is essentially similar in length and content to the curriculum found in the Model Plan. In addition, an equivalent examination must be essentially similar to the examination requirements found in the Model Plan.

Persons who have taken equivalent courses in their discipline for purposes of interim accreditation, and can produce evidence that they have successfully completed the course by passing an examination, are accredited on an interim basis under TSCA Title II. Evidence of successful completion of a course would include a certificate or photo identification card that showed the person completed the training course on a certain date and passed the examination.

For persons who took one of the EPA-approved courses for interim accreditation listed under Unit IV, but did not take the course's examination, these persons may become interimly accredited by passing an examination at an EPA-funded training center. These EPA funded training centers are listed under Unit IV. Before taking the exam, persons must provide evidence to the EPA-funded center that they previously had taken one of the training courses listed under Unit IV that is approved by EPA for interim accreditation.

Courses approved by EPA as of October 17 for interim accreditation are listed under Unit IV. Examinations offered by these courses also are approved for purposes of interim accreditation. EPA expects to approve additional courses for interim accreditation purposes, and will list these courses in subsequent Federal Register notices. Training course vendors that believe their courses offered since January 1, 1985 are suitable sources for interim accreditation should contact their EPA Regional asbestos coordinator (See addresses in Unit IV).

IV. List of EPA-Approved State Accreditation Programs and Training Courses

Below is the first listing of EPA-approved State accreditation programs and training courses. As discussed above, periodic notifications of EPA approval of State accreditations programs and EPA approval of training courses will be published in subsequent Federal Register notices. The closing date for the acceptance of submissions to EPA for inclusion in this first notice was early October. Omission from this list does not imply disapproval by EPA, nor does the order of the courses reflect priority or quality. The format of the notification lists first the State accreditation programs approved by EPA, followed by EPA-approved training courses listed by Region. The name, address, phone number, and contact person is provided for each training provider followed by the courses and type of course approval (i.e. full, contingent, or for interim purposes). Unless otherwise specified by an alternative date, interim approvals are issued from January 1, 1985.

All five of the EPA-funded asbestos information centers and the three EPA-funded satellite training centers will use the EPA model inspector and management planner course recently developed with EPA funds. As a result, EPA anticipates that all of the EPA-funded training facilities will receive approvals for inspection and management planning courses offered beginning in October. Currently, the EPA-funded centers at the Georgia Institute of Technology and the University of Illinois at Chicago have inspection and management planning courses that EPA has fully approved. The five centers are: The Georgia Institute of Technology in Atlanta, Georgia; the University of Kansas in Overland Park, Kansas; Tufts University in Medford, Massachusetts; the University of Illinois at Chicago, and the University of California, Berkeley. The three satellite centers are: The University of Texas at Arlington; the Robert Wood Johnson Medical School in Piscataway, New Jersey, and Temple University in Philadelphia, Pennsylvania. The University of Texas at Arlington has received contingent approval of its inspector and management planner course.

The recently developed EPA-funded model course for inspectors and management planners, and an earlier course developed with EPA funding for asbestos abatement contractors and supervisors are available for interested parties that plan to offer training courses. Interested parties should contact the following firm to receive copies of the training courses: Sterling Federal Systems, Incorporated, Suite 600, 6011 Executive Blvd., Rockville, MD 20852.

A fee for each course will be charged to cover the reproduction costs for the written and visual aid materials.

The following is the initial list of EPA-approved State accreditation programs and training courses:

Approved State Accreditation Programs

(1)(a) *State: Kansas*— State Agency: Kansas Department of Health and Environment, Forbes Field, Topeka, KS 66620. Attn: John C. Irwin (913) 296-1500.

(b) *Approved Accreditation Program Discipline*—Contractor/Supervisor (training and exam requirements (approved for interim accreditation).

Abatement worker [1] approved for interim accreditation).

Effective date of regulation: 1/6/1986.

(2)(a) *State: New Jersey*—State Agency: New Jersey Department of Health, CN 360, Trenton, New Jersey 08625-0360. Attn: James Brownlee (609) 984-2193.

(b) *Approved Accreditation Program Discipline*—Contractor/Supervisor. Abatement worker. Effective date of regulation: June 18, 1985.

EPA-Approved Training Courses

Region I—Boston, MA

Regional asbestos coordinator. Alison Roberts, EPA, Region I, Air and Management Division (APT-231), JFK Federal Building, Boston, MA 02203. (617) 565-3273 (FTS) 835-3275.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region I training courses and contact points for each, are as follows:

(1)(a) *Training provider.* Abatement Technology Corp., One Boston Place, Suite 1025, Boston, MA 02108. Attn: Scott Keyes (617) 723-3100.

(b) *Approved courses.* Contractor/Supervisor (contingent).

(2)(a) *Training provider.* Con-Test, P.O. Box 591, East Longmeadow, MA 01028. Attn: Brenda Bolduc (413) 525-1198.

(b) *Approved courses.* Contractor/Supervisor (contingent). Abatement Worker (contingent). Inspector/Management Planner (contingent). Refresher course (for each of the above disciplines) (contingent).

(3)(a) *Training provider.* Hygientics, Inc., 150 Causeway St., Boston, MA 02114. Attn: John W. Cowdery (617) 723-4664.

(b) *Approved courses.* Inspector (contingent).

(4)(a) *Training provider.* Institute for Environmental Education, 208 West Cummings Park, Woburn, MA 01801. Attn: Janet Oppenheim-McMullen (617) 935-7370.

(b) *Approved courses.* Contractor/Supervisor (full from 9/18/87). Inspector/Management planner (contingent).

(5)(a) *Training provider.* Maine Labor Group on Health Inc., P.O. Box 5, Augusta, Maine 04330. Attn: Dianna White (207) 239-2770.

(b) *Approved courses.* Contractor/Supervisor (contingent). Abatement Worker (contingent).

(6)(a) *Training provider.* New England Laborers' Training Trust Fund, 37 East Street, Hopkinton, MA 01748. Attn: Jim Merloni, Jr. (617) 435-6316.

(b) *Approved courses.* Abatement Workers (contingent).

(7)(a) *Training provider.* Tufts University, 474 Boston Ave., Medford, MA 02155. Attn: Brenda Cole (617) 381-3531.

(b) *Approved courses.* Contractor/Supervisor Course (Interim from 9/85-5/31/87). Contractor/Supervisor Course (Full from 6/22/87).

Region II—Edison, NJ

Regional asbestos coordinator. Arnold Freiberger, EPA, Region II, Woodbridge Ave., Raritan Depot, Bldg. 10, Edison, NJ 08837. (201) 321-6668, (FTS) 340-6671.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region II training courses and contact points for each, are as follows:

(1)(a) *Training provider.* UMDNJ Robert Wood Johnson Medical School, 675 Hoes Lane, Piscataway, NJ 08854-5635. Attn: Lee Laustsen (201) 463-4500.

(b) *Approved courses.* Abatement Worker (full from beginning). Contractor/Supervisor (full from beginning).

Region III—Philadelphia, PA

Regional asbestos coordinator. Pauline Levin, EPA, Region III (3HW-40), 841 Chestnut Bldg., Philadelphia, PA 19107. (215) 597-9859, (FTS) 597-9859.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region III training courses and contact points for each, are as follows:

(1)(a) *Training provider.* Alice Hamilton Center for Occupational Health, 410 7th Street SE., Second Floor, Washington, DC 20003. Attn: Brian Christopher (202) 543-0005.

(b) *Approved courses.* Abatement Workers (contingent).

(2)(a) *Training provider.* The Association of Wall and Ceiling Industries, 24 K Street, NE., Suite 300, Washington, DC 20002. Attn: Chris Hullinger (202) 783-2924.

(b) *Approved courses.* Abatement Worker (full 5/19/87). Contractor/Supervisor (full 5/19/87).

(3)(a) *Training provider.* Biospherics, Inc., 12051 Indian Creek Court, Beltsville, MD 20705. Attn: Marian F. Meiselman (301) 369-3900.

(b) *Approved courses.* Contractor/Supervisor (full from 10/1/87). Abatement worker (full from 10/1/87).

(4)(a) *Training provider.* Drexel University, Environmental Studies Institute, Building 29, 32nd and Chestnut Streets, #216, Philadelphia, PA 19104. Attn: Robert Ross (215) 895-2269.

(b) *Approved courses.* Contractor/Supervisor (full from beginning). Abatement Worker (full from beginning).

(5)(a) *Training provider.* South East Michigan Committee on Occupational Safety and Health (SEMCOSH), 1550 Howard Street, Detroit, MI 48216. Attn: Barbara Boylan (313) 961-3345.

(b) *Approved courses.* Abatement Worker (contingent).

(6)(a) *Training provider.* The National Training Fund for the Sheet Metal and Air Conditioning Industry (in conjunction with the Workers' Institute for Safety and Health), 1126 Sixteenth Street NW., Washington, DC 20036. Attn: Scott Schneider (202) 887-1980.

(b) *Approved courses.* Abatement Worker (contingent).

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[1] Applies only to workers who have taken the Kansas' Contractor/ Supervisor course and passed the State's worker exam.

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(7)(a) *Training provider.* Temple University, College of Engineering, 12th and Norris Streets, Philadelphia, PA 19122. Attn: Lester Levin (215) 787–6479.

(b) *Approved courses.* Contractor/Supervisor (full from beginning). Workers (full from beginning).

(8)(a) *Training provider.* Medical College of Virginia, Virginia Commonwealth University, Department of Preventive Medicine, P.O. Box 212, Richmond, VA 23298. Attn: Leonard Vance (804) 786–9785.

(b) *Approved courses.* Contractor/Supervisor (contingent).

(9)(a) *Training provider.* WACO, Inc., P.O. Box 836, 5450 Lewis Road, Sandston, VA 23150. Attn: William Belanich (804) 222–8440.

(b) *Approved courses.* Contractor/Supervisor (contingent). Abatement Workers (contingent).

Region IV—Atlanta, GA

Regional asbestos coordinator. Jim Littell, EPA Region IV, 345 Courtland St. NE., Atlanta, GA 30365, (404) 347–3864, (FTS) 257–3864.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region IV training courses and contact points for each, are as follows:

(1)(a) *Training provider.* University of Florida, TREEO Center, 3900 SW 63rd Blvd., Gainesville, FL 32608. Attn: Sandra Scaggs (904) 392–9570.

(b) *Approved courses.* Contractor/Supervisor (full from 5/87).

(2)(a) *Training provider.* Georgia Tech Research Institute, Environmental Health and Safety Division, Room 029, O'Keefe Building, Atlanta, GA 30332. Attn: William Ewing (404) 894–3806.

(b) *Approved courses.* Contractor/Supervisor (full from 5/11/87). Contractor/Supervisor (Interim from 6/85—5/10/87). Refresher Course for Contractor/Supervisor (contingent). Inspector/Management Planner (full from 10/87).

(3)(a) *Training provider.* National Asbestos Council, Training Department, 2786 North Decatur Road, Decatur, GA 30033. Attn: Eva Clay (404) 292–0629.

(b) *Approved courses.* Abatement Workers (2 day) (interim from beginning). Abatement Workers (3 day) (full from 7/87).

Region V—Chicago, IL

Regional asbestos coordinator. Anthony Restaino, EPA Region V, 536 S. Clark St., Chicago, IL 60604, (312) 886–6879, (FTS) 886–6879.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region V training courses and contact points for each, are as follows:

(1)(a) *Training provider.* AHP Research, Inc., 1501 Johnsons Ferry Rd., Suite 230, P.O. Box 71926, Marietta, GA 30007. Attn: Dwight Brown (404) 565–0061.

(b) *Approved courses.* Inspector/Management Planner (interim from beginning).

(2)(a) *Training provider.* BDN Industrial Hygiene Consultants, 8105 Valleywood Lane, Portage, MI 49002. Attn: Keith Nichols (616) 329–1237.

(b) *Approved courses.* Contractor/Supervisor (contingent).

(3)(a) *Training provider.* DeLisle Consulting and Laboratories, Inc., 2401 East Milham Ave., Kalamazoo, MI 49002. Attn: Mark DeLisle (616) 343–9698.

(b) *Approved courses.* Contractor/Supervisor (contingent).

(4)(a) *Training provider.* Heat & Frost Insulators Local 17, Apprentice Training Center, 3850 South Racine Ave., Chicago, IL 60609. Attn: John P. Shine (312) 247–1007

(b) *Approved courses.* Abatement Workers (contingent).

(5)(a) *Training provider.* I.P.C. Chicago, 4309 West Henderson, Chicago, IL 60641. Attn: Robert G. Cooley (312) 975–3495.

(b) *Approved courses.* Abatement Workers (contingent).

(6)(a) *Training provider.* University of Illinois at Chicago, Midwest Asbestos Information Center, 2035 Taylor, School of Public Health, Chicago, IL 60612. Attn: Tony Billotti (312) 996–5762.

(b) *Approved courses.* Contractor/Supervisor (full from beginning). Inspector/Management Planner (full). Abatement Worker (2 day) (interim from beginning to 10/1/87). Abatement Worker (3 day) (contingent).

Region VI—Dallas, TX

Regional asbestos coordinator. John West, 6t-Pt, EPA, Region VI, 1445 Ross Avenue, Dallas, TX 75202–2733, (214) 655–7244, (FTS) 255–7235.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region VI training courses and contact points for each, are as follows:

(1)(a) *Training provider.* GEBCO Associates, Inc., 805–A, Elizabeth Drive, Bedford, TX 76022. Attn: Ed Kirch (817) 268–4006.

(b) *Approved courses.* Asbestos Workers (full from 8/20/87). Asbestos Workers (interim prior to 8/19/87).

(2)(a) *Training provider.* The International Association of Heat and Frost Insulators and Asbestos Workers Union, Local 22, 3219 Pasadena Blvd., Pasadena, TX 77503. Attn: Owen Tilley (713) 473–0888.

(b) *Approved courses.* Asbestos Worker (3 day course) (contingent). Asbestos Worker (2 day course) (interim prior to 10/87). Worker refresher course (contingent).

(3)(a) *Training provider.* Louisiana State University and Agricultural and Mechanical College, Baton Rouge, LA 70803–1520. Attn: George Smith (504) 388–6621.

(b) *Approved courses.* Contractor/Supervisor (contingent).

(4)(a) *Training provider.* The Texas A&M University System, The Texas Engineering Extension Service, Building Codes Inspection Training Division, College Station, TX 77843–8000. Attn: Charles Flanders (409) 845–6682.

(b) *Approved courses.* Contractor/Supervisor (full from 9/14/87). Contractor/Supervisor (interim prior to 9/14/87). Abatement Worker (contingent). Inspector/Management Planner (contingent).

(5)(a) *Training provider.* The University of Texas at Arlington Satellite Center, Bureau of Engineering Research, P.O. Box 19020, Arlington, TX 76019. Attn: Ernest Crosby (817) 273–2557.

(b) *Approved courses.* Contractor/Supervisor (full from beginning). Inspector/Management Planner (contingent).

(6)(a) *Training provider.* Tulane University, School of Public Health and Tropical Medicine, Department of Environmental Health Sciences, 1430 Tulane Avenue, New Orleans, LA 70112. Attn: Shau-Wong Chang (504) 588–5374.

(b) *Approved courses.* Contractor/Supervisor (full from 9/15/87). Contractor/Supervisor (interim prior 9/14/87).

Region VII—Kansas City, KS

Regional asbestos coordinator. Wolfgang Brandner, EPA Region VII, 726 Minnesota Ave., Kansas City, KS 66101, (913) 236–2834, (FTS) 757–2834.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region VII training courses and contact points for each, are as follows:

(1)(a) *Training provider.* Hall-Kimbrell Environmental Services, 4840 West 15th St., Lawrence, KS 66046. Attn: Alice Hart (913) 749-2381.

(b) *Approved courses.* Contractor/Supervisor (full from 8/17/87). Abatement Worker (full from 8/17/87). Project Designer (full from 8/17/87). Inspector/Management Planner (full from 8/17/87).

(2)(a) *Training provider.* Mahew Environmental Training Assoc., Inc. (META), P.O. Box 1961, Lawrence, KS 66044. Attn: Brad Mayhew (913) 842-6382.

(b) *Approved courses.* Contractor/Supervisor (contingent). Abatement Worker (contingent).

(3)(a) *Training provider.* The University of Kansas National Asbestos Training Center, 6600 College Blvd., Suite 315, Overland Park, KS 66211. Attn: Lani Himegarner (913) 491-0181.

(b) *Approved courses.* Contractor/Supervisor (contingent). Contractor/Supervisor (interim from 6/85-9/9/87). Abatement Worker (contingent).

Region VIII—Denver, CO

Regional asbestos coordinator. David Combs, [8AT-TS], EPA, Region VIII, 1 Denver Place, 999-18th St., Suite 1300, Denver, CO 80202-2413. (303) 564-1730, (FTS) 564-1742.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region VIII training courses and contact points for each, are as follows:

(1)(a) *Training provider.* Northern Engineering and Testing, Inc. 600 South 25th Street, P.O. Box 30615, Billings, MT 59107. Attn: Kathleen Smit (406) 248-9161.

(b) *Approved courses.* Asbestos worker (contingent).

(2)(a) *Training provider.* Rocky Mountain Center for Occupational and Environmental Health, Building 512, University of Utah, Salt Lake City, UT 84112. Attn: Jeffery Lee (801) 581-5710.

(b) *Approved courses.* Contractor/Supervisor (contingent).

Region IX—San Francisco, CA

Regional asbestos coordinator. Joanne Semones, [T-52], EPA, Region IX, 215 Fremont St., San Francisco, CA 94105. (415) 974-7290, (FTS) 454-7290.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region IX training courses and contact points for each, are as follows:

(1)(a) *Training provider.* Environmental Sciences, 375 S. Meyer, Tucson, AZ 85701. Attn: Dale Keyes (602) 577-1764.

(b) *Approved courses.* Inspector/Management Planner (full).

(2)(a) *Training provider.* University of California at Berkeley Pacific Asbestos Information Center, U.C. Extension, 2223 Fulton St., Berkeley, CA 94720. Attn: Debra Dobin (415) 643-7143.

(b) *Approved courses.* Contractor/Supervisor (full from beginning).

Region X—Seattle, WA

Regional asbestos coordinator. Walter Jasper, EPA, Region X, 1200 Sixth Ave., Seattle, WA 98101. (206) 442-2870, (FTS) 399-2870.

List of approved courses. The following training courses have been approved by EPA. The courses are listed under (b). This approval is subject to the level of certification indicated after the course name. Courses are listed in alphabetical order and do not reflect a prioritization. Approvals for Region X training courses and contact points for each, are as follows:

No approvals for Region X.

Dated: October 17, 1987.

Lee M. Thomas,

Administrator.

[FR Doc. 87-24939 Filed 10-29-87; 8:45 am]

BILLING CODE 6560-50-M

PROPOSED

PROPOSED

Emission Standards and Procedural Requirements for Hazardous Air Contaminants

Policy

340-25-450 The Commission finds and declares that certain air contaminants for which there is no ambient air standard may cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness, and are therefore considered to be hazardous air contaminants. Air contaminants currently considered to be in this category are asbestos, beryllium, and mercury. Additional air contaminants may be added to this category provided that no ambient air standard exists for the contaminant, and evidence is presented which demonstrates that the particular contaminant may be considered as hazardous. It is hereby declared the policy of the Department that the standards contained herein and applicable to operators are to be minimum standards, and as technology advances, conditions warrant, and Department or regional authority rules require or permit, more stringent standards shall be applied.

Stat. Auth.: ORS CH.
Hist: DEQ 96.f.9-2-75,ef.9-25-75

Definitions

340-25-455 As used in this rules, and unless otherwise required by context:

(1) "Asbestos" means [actinolite, amosite, anthophyllite, crysotile, crocidolite, or tremolite.] "..the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite."

(2) "Asbestos-containing waste material" means any waste which contains friable asbestos material [commercial asbestos and is generated by a source subject to the provisions of this subpart,] including, but not limited to, asbestos mill tailings, control device asbestos waste, friable asbestos waste material, asbestos abatement project waste, and bags or containers that previously contained commercial asbestos.

(3) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or disposal of any material with the potential of releasing asbestos fibers into the air."

[3](4) "Asbestos manufacturing operation" means the combining of commercial asbestos, or in the case of woven friction products, the combining of textiles containing commercial asbestos with any other material(s) including

commercial asbestos, and the processing of this combination into a product as specified in rule 340-25-465.

[4](5) "Asbestos-containing material" means asbestos or any material containing at least 1% asbestos by weight, including particulate asbestos material.

[5[(6) "Asbestos mill" means any facility engaged in the conversion or any intermediate step in the conversion of asbestos ore into commercial asbestos.

[6](7) "Asbestos tailings" means any solid waste product of asbestos mining or milling operations which contains asbestos.

[7](8) "Beryllium" means the element beryllium. Where weight or concentrations are specified in these rules, such weights or concentrations apply to beryllium only, excluding any associated elements.

[8](9) "Beryllium alloy" means any metal to which beryllium has been added in order to increase its beryllium content, and which contains more than 0.1 percent beryllium by weight.

[9](10) "Beryllium containing waste" means any material contaminated with beryllium and/or beryllium compounds used or generated during any process or operation performed by a source subject to these rules.

[10](11) "Beryllium ore" means any naturally occurring material mined or gathered for its beryllium content.

[11](12) "Commercial asbestos" means any variety of asbestos which is produced by extracting asbestos from asbestos ore.

[12](13) "Commission" means the Environmental Quality Commission.

[13](14) "Demolition" means the wrecking or removal of any [boiler, duct, pipe, or structural member insulated or fireproofed with asbestos material or of any other thing made of friable asbestos such as decorative panels.] structural member of a facility together with related handling operations.

[14](15) "Department" means the Department of Environmental Quality.

[15](16) "Director" means the Director of the Department or regional authority and authorized deputies or officers.

(17) "Facility" means all or part of any public or private building, structure, installation, equipment, vehicle or vessel, including but not limited to ships.

[16](18) "Friable asbestos material" means any [asbestos material easily crumbled or pulverized by hand, resulting in the release of particulate asbestos material. This definition shall include any friable asbestos debris.] asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry."

[17](19) "Hazardous air contaminant" means any air contaminant considered by the Department or Commission to cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness and for which no ambient air standard exists.

[18](20) "Mercury" means the element mercury, excluding any associated elements and includes mercury in particulates, vapors, aerosols, and compounds.

[19](21) "Mercury ore" means any mineral mined specifically for its mercury content.

[20](22) "Mercury ore processing facility" means a facility processing mercury ore to obtain mercury.

[21](23) "Mercury chlor-alkali cell" means a device which is basically composed of an electrolyzer section and a denuder (decomposer) section, and utilizes mercury to produce chlorine gas, hydrogen gas, and alkali metal hydroxide.

[22](24) "Particulate asbestos material" means any finely divided particles of asbestos material.

[23](25) "Person" means any individual, corporation, association, firm, partnership, joint stock company, public and municipal corporation, political sub-division, the state and agency thereof, and the federal government and any agency thereof.

[24](26) "Propellant" means a fuel and oxidizer physically or chemically combined, containing beryllium or beryllium compounds, which undergoes combustion to provide rocket propulsion.

[25](27) "Propellant plant" means any facility engaged in the mixing, casting, or machining of propellant.

[26](28) "Regional authority" means any regional air quality control authority established under the provisions of ORS 468.505.

[27](29) "Renovation" means [the removing or stripping of friable asbestos material used to insulate or fireproof any pipe, duct, boiler, tank, reactor, turbine, furnace, decorative panel, surface or structural member.] altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or removed are excluded.

(30) "Small-scale asbestos abatement project" means any asbestos abatement project which meets the definition given in OAR 340-33-020(17).

[28](31) "Startup" means commencement of operation of a new or modified source resulting in release of contaminants to the ambient air.

[29](32) "Structural member" means any load-supporting member of a facility, such as beams and load-supporting walls; or any non-supporting member, such as ceilings and non-load-supporting walls.

Stat. Auth.: ORS Ch. 468
Hist: DEQ 96, f.9-2-75, ef. 9-25-75; DEQ 22-1982, f. & ef. 10-21-82

General Provisions

340-25-460(1) Applicability. The provisions of these rules shall apply to any source which emits air contaminants for which a hazardous air contaminant standard is prescribed. Compliance with the provisions of these rules shall not relieve the source from compliance with other applicable rules of the Oregon Administrative Rules, Chapter 340, or with applicable provisions of the Oregon Clean Air Implementation Plan.

(2) Prohibited activities:

(a) No person shall operate any source of emissions subject to these rules without first registering such source with the Department following procedures established by ORS 468.320 and OAR 340-20-005 through 340-20-015. Such registration shall be accomplished within ninety (90) days following the effective date of these rules.

(b) After the effective date of these rules, no person shall construct a new source or modify any existing source so as to cause or increase emissions of contaminants subject to these rules without first obtaining written approval from the Department.

(c) No person subject to the provisions of these emission standards shall fail to provide reports or report revisions as required in these rules.

(3) Application for approval of construction or modification. All applications for construction or modification shall comply with the requirements of rules 340-20-020 through 340-20-030 and the requirements of the standards set forth in these rules.

(4) Notification of startup. Notwithstanding the requirements of rules 340-20-020 through 340-20-030, any person owning or operating a new source of emissions subject to these emission standards shall furnish the Department written notification as follows:

(a) Notification of the anticipated date of startup of the source not more than sixty (60) days nor less than thirty (30) days prior to the anticipated date.

(b) Notification of the actual startup date of the source within fifteen (15) days after the actual date.

(5) Source reporting and approval request. Any person operating any existing source, or any new source for which a standard is prescribed in these rules which had an initial startup which preceded the effective date of these rules shall provide the following information to the Department within ninety (90) days of the effective date of these rules:

(a) Name and address of the owner or operator.

(b) Location of the source.

(c) A brief description of the source, including nature, size, design, method of operations, design capacity, and identification of emission points of hazardous contaminants.

(d) The average weight per month of materials being processed by the source and percentage by weight of hazardous contaminants contained in the processed materials, including yearly information as available.

(e) A description of existing control equipment for each emission point, including primary and secondary control devices and estimated control efficiency of each control device.

(6) Source emission tests and ambient air monitoring:

(a) Emission tests and monitoring shall be conducted using methods set forth in 40 CFR, Part 61, Appendix B, as published in the Code of Federal Regulations last amended by the Federal Register, [June 8, 1982, pages 24703 to 24716.] June 1, 1987, at 52 FR 20398. The methods described in 40 CFR, Part 61, Appendix B, are adopted by reference and made a part of these rules. Copies of these methods are on file at the Department of Environmental Quality.

(b) At the request of the Department, any source subject to standards set forth in these rules may be required to provide emission testing facilities as follows:

(A) Sampling ports, safe sampling platforms, and access to sampling platforms adequate for test methods applicable to such source.

(B) Utilities for sampling and testing equipment.

(c) Emission tests may be deferred if the Department determines that the source is meeting the standard as proposed in these rules. If such a deferral of emission tests is requested, information supporting the request shall be submitted with the request for written approval of operation. Approval of a deferral of emission tests shall not in any way prohibit the Department from canceling the deferral if further information indicates that such testing may be necessary to insure compliance with these rules.

(7) Delegation of authority. The Commission may, when any regional authority requests and provides evidence demonstrating its capability to carry out the provisions of these rules relating to hazardous contaminants, authorize and confer jurisdiction within its boundary until such authority and jurisdiction shall be withdrawn for cause by the Commission. Such a regional authority may establish, collect, retain, and expend project notification fees for asbestos abatement projects within its jurisdiction for the purpose of supporting the regional authority's asbestos control program. Fee amounts established by a regional authority may differ from the fee amounts established by the Department under these rules.

[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality in Portland.]

Stat. Auth.: ORS Ch. 468
Hist: DEQ 96, f. 9-2-75, ef. 9-25-75; DEQ 22-1982, f. & ef. 10-21-82

Emission Standards and Procedural Requirements for Asbestos

340-25-465(1) Emission standard for asbestos mills. No person shall cause to be discharged into the atmosphere any visible emissions from any asbestos milling operation except as provided under section (7) of this rule. For purposes of these rules, the presence of uncombined water in the emission plume shall not be cause for failure to meet the visible emission requirement. Outside storage of asbestos materials is not considered a part of an asbestos mill.

(2) Roadways and Parking Lots. The surfacing of roadways, parking lots or any other surface covering on which vehicle traffic might reasonably be expected to occur, with asbestos tailings or asbestos material is prohibited, except for temporary roadways on an area of asbestos ore deposits. For purposes of these rules, the deposition of asbestos tailings on roadways covered by snow or ice is considered surfacing.

(3) Manufacturing. No person shall cause to be discharged into the atmosphere any visible emissions, except as provided in section (7) of this rule, from any building or structure in which manufacturing operations utilizing commercial asbestos are conducted, or directly from any such manufacturing operations if they are conducted outside buildings or structures. Visible emissions from boilers or other points not producing emissions directly from the manufacturing operation ;and having no possible asbestos material in the exhaust gases shall not be considered for purposes of this rule. The presence of uncombined water in the exhaust plume shall not be cause for failure to meet the visible emission requirements. Manufacturing operations considered for purposes of these rules are as follows:

(a) The manufacture of cloth, cord, wicks, tubing, tape, twine, rope, thread, yarn, roving, lap, or other textile materials.

(b) The manufacture of cement products.

(c) The manufacture of fireproofing and insulating materials.

(d) The manufacture of friction products.

(e) The manufacture of paper, millboard, and felt.

(f) The manufacture of floor tile.

(g) The manufacture of paints, coatings, caulks, adhesives, or sealants.

(h) The manufacture of plastics and rubber materials.

(i) The manufacture of chlorine.

(j) The manufacture of shotgun shells.

(k) The manufacture of asphalt concrete.

(l) Any other manufacturing operation which results or may result in the release of asbestos material to the ambient air.

(4) [Demolition and renovation] Asbestos abatement projects. All persons, both the contractor and the owner, intending to [demolish any institutional, commercial, or industrial building, including apartment buildings having four or more dwelling units, structure, facility, installation, or any vehicle or vessel including, but not limited to, ships; or any portion thereof which contains any boiler, pipe, duct, tank, reactor, turbine, furnace, or structural member that is insulated or fireproofed with friable asbestos material] conduct an asbestos abatement project shall comply with the requirements set forth in this rule[:]. Any asbestos abatement project in a private residence is exempt from OAR 340-25-465(4) if the residence is occupied by the owner and the owner occupant performs the asbestos abatement. Any activity which is exempted under OAR 340-33-100 is also exempt from OAR 340-25-465(4).

[(a) Notice of intention to demolish and/or renovate shall be provided to the Department prior to commencement of such demolition and/or renovation. Such notice shall include the following information:]

(a) Notification requirement. Each facility owner or operator, or contractor to which this section applies shall:

Notification

(A) Provide the Department with written notice on a Department form of intent to conduct any asbestos abatement project. Submit the written notice and project notification fee at least 10 days before beginning any asbestos abatement project; or

(B) Facility owners or operators employing workers certified as required by OAR 340-33-060 to conduct small-scale asbestos abatement projects at the facility may notify the Department as follows:

(i) Establish eligibility for use of this procedure with the Department prior to use.

(ii) Maintain on file with the Department a general asbestos abatement plan containing the information specified in subsection (D) below, to the extent possible, and

(iii) Provide to the Department a summary report of all small-scale asbestos abatement projects conducted at the facility in the previous three months by the 15th day of the month following the end of the calendar quarter.

OREGON ADMINISTRATIVE RULES

LICENSING AND CERTIFICATION REQUIREMENTS

ASBESTOS REQUIREMENTS

AUTHORITY, PURPOSE, & SCOPE

340-33-010 (1) Authority. These rules are promulgated in accordance with and under the authority of ORS 468.893.

(2) Purpose. The purpose of these rules is to provide reasonable standards for:

(a) training and licensing of asbestos abatement project contractors,

(b) training and certification of asbestos abatement project supervisors and workers,

(c) accreditation of providers of training of asbestos contractors, supervisors, and workers,

(d) administration and enforcement of these rules by the Department.

(3) Scope

(a) OAR 340-33-000 through -110 is applicable to all work, including demolition, renovation, repair, construction, or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling, or disposal of any material which could potentially release asbestos fibers into the air; except as provided in (b) and (c) below.

(b) OAR 340-33-000 through -110 do not apply to an asbestos abatement project performed in a private residence if the residence is occupied by the owner, and the owner occupant is performing the asbestos abatement work.

(c) OAR 340-33-010 through -110 do not apply to persons performing vehicle brake and clutch maintenance or repair.

(d) Full scale asbestos abatement projects are differentiated from smaller projects. Small-scale asbestos abatement projects as defined by OAR 340-33-020(18) are limited by job size and include projects,

(A) where the primary intent is to disturb the asbestos-containing material and prescribed work practices are used, and

(B) where the primary intent is not to disturb the asbestos-containing material.

(e) The Department has determined that asbestos-abatement projects involving some materials do not cause a worker or public health hazard if reasonable safety precautions are used. Provisional exemptions for these materials are listed in OAR 340-33-100.

(f) OAR 340-33-000 through -110 provide training, licensing, and certification standards for implementation of OAR 340-25-465, Emission Standards and Procedural Requirements for Asbestos.

DEFINITIONS

340-33-020 As used in these rules,

(1) "Accredited" means a provider of asbestos abatement training courses is authorized by the Department to offer training courses that satisfy requirements for contractor licensing and worker training.

(2) "Agent" means an individual who works on an asbestos abatement project for a contractor but is not an employe of the contractor.

(3) "Asbestos" means the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

(4) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or disposal of any asbestos-containing material which could potentially release asbestos fibers into the air.

(5) "Asbestos-containing material" means any material containing more than one percent asbestos by weight.

(6) "Certified" means a worker has met the Department's training, experience, and/or quality control requirements and has a current certification card.

(7) "Contractor" means a person that undertakes for compensation an asbestos abatement project for another person. As used in this subsection, "compensation" means wages, salaries, commissions and any other form of remuneration paid to a person for personal services.

(8) "Commission" means the Environmental Quality Commission.

(9) "Department" means the Department of Environmental Quality.

(10) "Director" means the Director of the Department of Environmental Quality.

(11) "EPA" means the United States Environmental Protection Agency.

(12) "Facility" means all or part of any public or private building, structure, installation, equipment, vehicle or vessel, including but not limited to ships.

(13) "Friable asbestos material" means any asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry.

(14) "Full-scale asbestos abatement project" means any removal, renovation, encapsulation, repair or maintenance of any asbestos-containing material which could potentially release asbestos fibers into the air, and which is not classified as a small-scale project as defined by (17) below.

(15) "Licensed" means a contracting entity has met the Department's training, experience, and/or quality control requirements to offer and perform asbestos abatement projects and has a current asbestos abatement contractor license.

(16) "Persons" means an individual, public or private corporation, nonprofit corporation, association, firm, partnership, joint venture, business trust, joint stock company, municipal corporation, political subdivision, the state and any agency of the state or any other entity, public or private, however organized.

(17) "Small-scale asbestos abatement project" means small-scale, short-duration projects as defined by (18) below, and/or removal, renovation, encapsulation, repair, or maintenance procedures intended to prevent asbestos containing material from releasing fibers into the air and which:

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(a) Remove, encapsulate, repair or maintain less than 40 linear feet or 80 square feet of asbestos-containing material;

(b) Do not subdivide an otherwise full-scale asbestos abatement project into smaller sized units in order to avoid the requirements of these rules;

(c) Utilize all practical worker isolation techniques and other control measures; and

(d) Do not result in worker exposure to an airborne concentration of asbestos in excess of 0.1 fibers per cubic centimeter of air calculated as an eight (8) hour time weighted average.

(18) "Small-scale, short-duration renovating and maintenance activity" means a task for which the removal of asbestos is not the primary objective of the job, including, but not limited to:

(a) Removal of quantities of asbestos-containing insulation on pipes;

(b) Removal of small quantities of asbestos-containing insulation on beams or above ceilings;

(c) Replacement of an asbestos-containing gasket on a valve;

(d) Installation or removal of a small section of drywall; or

(e) Installation of electrical conduits through or proximate to asbestos-containing materials.

Small-scale, short duration activities shall be limited to no more than 40 linear feet or 80 square feet of asbestos containing material. An asbestos abatement activity that would otherwise qualify as a full-scale abatement project shall not be subdivided into smaller units in order to avoid the requirements of these rules.

(19) "Trained worker" means a person who has successfully completed specified training and can demonstrate knowledge of the health and safety aspects of working with asbestos.

(20) "Worker" means an employe or agent of a contractor or facility owner or operator.

GENERAL PROVISIONS

340-33-030 (1) Persons engaged in the removal, encapsulation, repair, or enclosure of any asbestos-containing material which has the potential of releasing asbestos fibers into the air must be licensed or certified, unless exempted by OAR 340-33-010(3).

(2) An owner or operator of a facility shall not allow any persons other than those employees of the facility owner or operator who are appropriately certified or a licensed asbestos abatement contractor to perform an asbestos abatement project in or on that facility. Facility owners and operators are not required to be licensed to perform asbestos abatement projects in or on their own facilities.

(3) Any contractor engaged in a full-scale asbestos abatement project must be licensed by the Department under the provisions of OAR 340-33-040.

(4) Any person acting as the supervisor of any full-scale asbestos abatement project must be certified by the Department as a Supervisor for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050.

(5) Any worker engaged in or working on any full-scale asbestos abatement project must be certified by the Department as a Worker for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050.

(6) Any contractor or worker engaged in any small-scale asbestos abatement project as defined by OAR 340-33-020(17)(a) through (d) or 340-33-020(18), but not licensed or certified to perform full-scale asbestos abatement projects, must be licensed or certified by the Department as a Small-Scale Asbestos Abatement Contractor or a Worker for Small-Scale Asbestos Abatement, respectively under the provisions of OAR 340-33-040 and -050.

(7) Any provider of training which is intended to satisfy the licensing and certification training requirements of these rules must be accredited by the Department under the provisions of OAR 340-33-060.

(8) Any person licensed, certified, or accredited by the Department under the provisions of these rules shall comply with the appropriate provisions of OAR 340-25-465 and OAR 340-33-000 through -110, or be subject to suspension or revocation of license, or certification, or accreditation.

(9) Asbestos abatement contractors and workers may perform asbestos abatement projects without a license or certificate until January 1, 1989. Thereafter, any contractor or worker engaged in an asbestos abatement project must be licensed or certified by the Department.

(10) The Department may accept evidence of violations of these rules from representatives of other federal, state, or local agencies.

(11) A regional air pollution authority may inspect for and enforce against violations of licensing and certification regulations. A regional air pollution authority may not approve, deny, suspend or revoke a training provider accreditation, contractor license, or worker certification, but may refer violations to the Department and recommend denials, suspensions, or revocations.

(12) An extension of time beyond January 1, 1989, for mandatory contractor licensing, supervisor certification or worker certification may be approved by the Commission if:

(a) Adequate accredited training as required for any of the categories of licensing or certification is not available in the State, and

(b) There is a public health or worker danger created due to inadequate numbers of appropriately licensed or certified persons to properly perform asbestos abatement activities.

(13) Variances from these rules may be granted by the Commission under ORS 468.345.

CONTRACTOR LICENSING

340-33-040 (1) Contractors may be licensed to perform either of the following categories of asbestos abatement projects:

(a) Full-Scale Asbestos Abatement Contractors: All asbestos abatement projects, regardless of project size or duration, or

(b) Small-Scale Asbestos Abatement Contractor: Small-scale asbestos abatement projects.

(2) Application for licenses shall be submitted on forms prescribed by the Department and shall be accompanied by:

(a) Documentation that the contractor, or contractor's employee representative, is certified at the appropriate level by the Department:

(A) Full-scale Asbestos Abatement Contractor license: Certified Supervisor for Full-Scale Asbestos Abatement.

(B) Small-Scale Asbestos Abatement Contractor: Certified Worker for Small-Scale Asbestos Abatement.

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(b) Certification that the contractor has read and understands the applicable Oregon and federal rules and regulations on asbestos abatement and agrees to comply with the rules and regulations.

(c) A list of all certificates or licenses, issued to the contractor by any other jurisdiction, that have been suspended or revoked during the past one (1) year, and a list of any asbestos-related enforcement actions taken against the contractor during the past one (1) year.

(d) List any additional project supervisors for full-scale projects and their certification numbers Supervisors for Full-Scale Asbestos Abatement at the Certified Supervisor level.

(e) Summary of asbestos abatement projects conducted by the contractor during the past 12 months.

(f) A license application fee.

(3) The Department will review the application for completeness. If the application is incomplete, the Department shall notify the applicant in writing of the deficiencies.

(4) The Department shall deny, in writing, a license to a contractor who has not satisfied the license application requirements.

(5) The Department shall issue a license to the applicant after the license is approved.

(6) The Department shall grant a license for a period of 12 months. Licenses may be extended during Department review of a renewal application.

(7) Renewals:

(a) License renewals must be applied for in the same manner as is required for an initial license.

(b) For renewal, the contractor or employee representative must have completed at least the appropriate annual refresher course.

(c) The complete renewal application shall be submitted no later than 60 days prior to the expiration date.

(8) The Department may suspend or revoke a license if the licensee:

(a) Fraudulently obtains or attempts to obtain a license.

(b) Fails at any time to satisfy the qualifications for a license or comply with the rules adopted by the Commission.

(c) Fails to meet any applicable state or federal standard relating to asbestos abatement.

(d) Permits an untrained or uncertified worker to work on an asbestos abatement project.

(e) Employs a worker who fails to comply with applicable state or federal rules or regulations relating to asbestos abatement.

(9) A contractor who has a license revoked may reapply for a license after demonstrating to the Department that the cause of the revocation has been resolved.

WORKER CERTIFICATION

340-33-050 (1) Workers on asbestos abatement projects shall be certified at one or more of the following levels:

(a) Certified Supervisor for Full-Scale Asbestos Abatement.

(b) Certified Worker for Full-Scale Asbestos Abatement.

(c) Certified Worker for Small-Scale Asbestos Abatement.

(2) Application for Certification-General Requirements

(a) Applications shall be submitted to the provider of the accredited training course within thirty (30) days of completion of the course.

(b) Applications shall be submitted on forms prescribed by the Department and shall be accompanied by:

(A) Proof that the applicant is at least 18 years of age.

(B) A certification fee

(3) Application to be a Certified Supervisor for Full-Scale Asbestos Abatement shall include:

(a) Documentation that the applicant has successfully completed the Supervisor for Full-Scale Asbestos Abatement level training and examination as specified in the Department guidance document, and

(b) Documentation that the applicant has been certified as a Worker for Full-Scale Asbestos Abatement and has at least 3 months of full-scale asbestos abatement experience, including time on powered air purifying respirators and experience on at least five separate asbestos abatement projects.

(4) Application to be a Certified Worker for Asbestos Abatement shall include:

(a) Documentation that the applicant to be a Certified Worker for Full-Scale Asbestos Abatement has successfully completed the Worker for Full-Scale Asbestos Abatement level training and examination as specified in the Department guidance document.

(b) Documentation that the applicant to be a Certified Worker for Small-Scale Asbestos Abatement has successfully completed the Worker for Small-Scale Asbestos Abatement level training and examination as specified in the Department guidance document.

(5) Training course providers shall issue certification to an applicant who has fulfilled the requirements of certification.

(6) Certification at all levels is valid for a period of twenty-four (24) months after the date of issue.

(7) Renewals

(a) Certification renewals must be applied for in the same manner as application for original certification.

(b) To gain renewal of certification, the worker must complete the appropriate annual refresher course no sooner than nine (9) months and no later than twelve (12) months after the issuance date of the certificate, and again no sooner than three (3) months prior to the expiration date of the certificate.

(8) The Department may suspend or revoke a worker's certificate for failure to comply with any state or federal asbestos abatement rule or regulations.

(9) If a certification is revoked, the worker may reapply for another initial certification only after twelve (12) months from the revocation date.

(10) A current worker certification photo identification card shall be available for inspection at each asbestos abatement project site for each worker conducting asbestos abatement activities on the site.

TRAINING PROVIDER ACCREDITATION

340-33-060 (1) General

(a) Asbestos training courses required for licensing or certification under these rules may be provided by any person, environmental or health consulting firm, union or trade association, educational institution, public health organization, or other entity.

(b) Any training provider offering training in Oregon to satisfy these certification and licensing requirements must be accredited by the Department.

(c) Each of the different training courses which are to be used to fulfill training requirements shall be individually accredited by the Department.

(d) The training provider must satisfactorily demonstrate through application and submission of course agenda, faculty resumes, training manuals, examination materials, equipment inventory, and performance during on-site course audits by Department representatives that the provider meets the minimum requirements established by the Department.

(e) The training course sponsor shall limit each class to a maximum of thirty participants unless granted an exception in writing by the Department. The student to instructor ratio for hands-on training shall be equal to or less than ten to one (10:1). To apply for an exception allowing class size to exceed thirty, the course sponsor must submit the following information in writing to the Department for evaluation and approval prior to expanding the class size.

(A) The new class size limit,

(B) The teaching methods and techniques for training the proposed larger class,

(C) The protocol for conducting the written examination, and

(D) Justification for a larger class size.

(f) Course instructors must have academic credentials, demonstrated knowledge, prior training, or field experience in their respective training roles.

(g) The Department may require any accredited training provider to use examinations developed by the Department in lieu of the examinations offered by the training provider.

(h) Training providers seeking accreditation for courses conducted since January 1, 1987, may apply for accreditation of those course offerings as though they were applying for initial accreditation. Contractors and workers trained by these providers since January 1, 1987 may be eligible to use this prior training as satisfaction of the initial training required by these licensing and certification rules.

(i) The Department may require accredited training providers to pay a fee equivalent to reasonable travel expenses for one Department representative to audit any accredited course which is not offered in the State of Oregon for compliance with these regulations. This condition shall be an addition to the standard accreditation application fee.

(2) Application for Accreditation.

(a) Application for accreditation shall be submitted to the Department in writing on forms provided by the Department and attachments. Such applications shall, as a minimum, contain the following information:

A. Name, address, telephone number of the firm, individual(s), or sponsors conducting the course, including the name under which the training provider intends to conduct the training.

B. The type of course(s) for which approval is requested.

C. A detailed course outline showing topics covered and the amount of time given to each topic, including the hands-on skill training.

D. A copy of the course manual, including all printed material to be distributed in the course.

E. A description of teaching methods to be employed, including description of audio-visual materials to be used. The Department may, at its discretion, request that copies of the materials be provided for review. Any audio-visual materials provided to the Department will be returned to the applicant.

F. A description of the hands-on facility to be utilized including protocol for instruction, number of students to be accommodated, the number of instructors, and the amount of time for hands-on skill training.

G. A description of the equipment that will be used during both classroom lectures and hands-on training.

H. A list of all personnel involved in course preparation and presentation and a description of the background, special training and qualification of each, as well as the subject matter covered by each.

I. A copy of each written examination to be given including the scoring methodology to be used in grading the examination; and a detailed statement about the development and validation of the examination.

J. A list of the tuition or other fees required.

K. A sample of the certificate of completion and photo identification card.

L. A list of any states or accrediting systems that approve the training course.

M. A description of student evaluation methods (other than written examination to be used) associated with the hands-on skill training, as applicable.

N. A description of course evaluation methods used by students.

O. Any restriction on attendance such as class size, language, affiliation, and/or target audience of class.

P. Any additional information or documentation as may be required by the Department to evaluate the adequacy of the application.

Q. Accreditation application fee.

(b) Application for initial training course accreditation and course materials shall be submitted to the Department at least 45 days prior to the requested approval date.

(c) Upon approval of an initial or refresher asbestos training course, the Department will issue a certificate of accreditation. The certificate is valid for one year from the date of issuance.

(d) Application for renewal of accreditation must follow the procedures described for the initial accreditation. In addition, course instructors must demonstrate that they have maintained proficiency in their instructional specialty and adult training methods during the twelve (12) months prior to renewal.

(3) Denial, Suspension or Revocation of Certificate of Accreditation. The Director may deny, revoke or suspend an application or current accreditation upon finding of sufficient cause. Applicants and certificate holders shall also be advised of the duration of suspension or revocation and any conditions that must be met before certificate reinstatement. Applicants shall have the right to appeal the Director's determination through an administrative hearing in accordance with the provisions of OAR Chapter 340 Division 11. The following may be considered grounds for denial, revocation or suspension:

(a) False statements in the application, omission of required documentation or the omission of information.

(b) Failure to provide or maintain the standards of training required by these regulations.

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The summary report shall include the starting and completion dates; location at the facility; amount of asbestos abated by removal: linear feet, square feet, thickness; and a description of any significant variations from the general asbestos abatement plan, for each project.

(iv) Submit the project notification fee prior to use of this notification procedure and annually thereafter; or

(C) Contractors performing small-scale asbestos abatement projects may notify the Department as follows:

(i) Establish eligibility for use of this procedure with the Department prior to use;

(ii) Maintain on file with the Department a general asbestos abatement plan containing the information specified in subsection (D) below, to the extent possible;

(iii) Provide to the Department a monthly summary of all small-scale projects performed by the 15th day of the following month including the starting and completion dates; project location; amount of asbestos abated by removal: linear feet, square feet, thickness; and a description of any significant variations from the general asbestos abatement plan for each project.

(iv) Provide to the Department, upon request, a list of asbestos abatement projects which are scheduled or are being conducted at the time of the request.

(v) Submit the project notification fee in advance.

(D) Provide the following information on the notification form:

[(A)](i) Name and address of person intending to engage in [demolition.] asbestos abatement.

[(B)](ii) Description of building, structure, facility, installation, vehicle, or vessel to be demolished or renovated, including address or location where the [demolition] asbestos abatement project is to be accomplished.

(iii) Contractor's Oregon asbestos abatement license number and certificate number of the supervisor, when applicable, or certification number of the facility owner or operator's trained worker.

(iv) Facility owner's or operator's name, address and phone number.

[(C)](v) Scheduled starting and completion dates of [demolition.] asbestos abatement work.

[(D)](vi) Method of [demolition and/or of renovation] asbestos abatement to be employed.

[(E)](vii) Procedures to be employed to insure compliance with provisions of this section.

(viii) Description of the asbestos type, approximate asbestos content (percent), and location of the asbestos-containing material.

(ix) Amount of asbestos to be abated: linear feet, square feet, thickness.

(x) Names, addresses, and phone numbers of waste transporters, if different than abatement contractor.

[(F)](xi) Name and address or location of the waste disposal site where the friable asbestos waste will be deposited.

[(G) Name and address of owner of facility to be demolished or renovated.]

(xii) Description of asbestos disposal procedure.

(E) Notification by phone is permitted in case of an emergency involving protection of life, health or property. Notification shall include the information contained in (5) above, and the date of the contract if applicable. Written notification shall be submitted within three (3) days after the start of the emergency abatement.

(F) Notify the Department prior to any changes in scheduled dates.

(b) Notification fees

(A) Facility owners or operators, or contractors, shall pay to the Department a project notification fee of:

(i) Twenty-five dollars ($25) for each small-scale asbestos abatement project.

(ii) Twenty-five dollars ($25) for each monthly notification of small-scale projects under OAR 340-25-465(4)(a)(C).

(iii) Two hundred dollars per year ($200/yr) for small-scale projects conducted by certified employees of facility owners or operators, as part of an operation and maintenance program under OAR 340-25-465(4)(a)(B).

(iv) Fifty dollars ($50) for each project greater than 40 linear feet or 80 square feet, and less than 260 linear feet or 160 square feet.

(v) Two hundred dollars ($200) for each project greater than 260 linear feet or 160 square feet, and less than 2600 linear feet or 1600 square feet.

(vi) Five hundred dollars ($500) for each project greater than 2600 linear feet or 1600 square feet.

(B) No project notification fee shall be assessed for asbestos abatement projects conducted in the following residential buildings: site-built homes, modular homes constructed offsite, condominium units, mobile homes, and duplexes or other multi-unit residential buildings consisting of four units or less.

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(C) For the purposes of this fee schedule, each 3-month period of an ongoing abatement project shall be assessed another project notification fee.

(D) Requests for waiver of fees shall be made in writing to the Director, on a case-by-case basis, and be based upon financial hardship. Applicants for waivers must describe the reason for the request and certify financial hardship. The Director may waive part or all of a fee.

(E) Project notification fees shall be payable with the completed project notification form. No notification will be considered to have occurred until the notification fee is submitted.

(F) Failure of provide payment for an operation and maintenance program fee shall void the operation and maintenance program and each subsequent abatement project shall be individually assessed the appropriate fee based on the size of the project.

(G) The project notification fee specified in OAR 340-465(4)(b)(A) shall be increased by 50% when an asbestos abatement project is commenced without filing of a project notification and/or submittal of a notification fee.

[(b)](c) The following procedures shall be employed to prevent emissions [illegible] particulate asbestos material into the ambient air:

[(A) Friable asbestos materials used to insulate, decorate or fireproof any boiler, pipe, duct, or structural member shall be wetted and removed from any building, structure, facility, installation, or vehicle or vessel before demolition of structural members is commenced. Boilers, pipe, duct, or structural members that contain or are insulated or fireproofed with friable asbestos materials may be removed as units or in sections without stripping or wetting, except that where the boiler, pipe, duct, or structural member is cut or disjointed the exposed friable asbestos material shall be wetted. Friable asbestos debris shall be wetted adequately to insure that such debris remains wet during all stages of demolition and related handling operations.

(B) No pipe, duct, or structural member that is covered with asbestos material shall be dropped or thrown to the ground from any building structure, facility, installation, vehicle, or vessel subject to this section, but shall be carefully lowered or taken to ground level in such a manner as to insure that no particulate asbestos material is released to the ambient air.

(C) No friable asbestos debris shall be dropped or thrown to the ground rom any building structure, facility, installation, vehicle, or vessel subject to this section, or from any floor to any floor below. Any debris generated as a result of demolition occurring fifty (50) feet (15.24 meters) or greater above ground level shall be transported to the ground via dust-tight chutes or containers.

(D) For renovation operations, local exhaust ventilation and collection systems may be used, instead of wetting; these systems shall comply with section (7) of this rule.

(c) Any person intending to demolish a building, structure, facility, or installation subject to the provisions of this section, but which has been declared by proper state or local authorities to be structurally unsound and which is in danger of imminent collapse is exempt from the requirements of this section, other than the reporting requirements specified in subsection (4)(a) of this rule, and the wetting of friable asbestos debris as specified in paragraph (4)(b) of this rule.

(d) Sources located in cities or other areas of local jurisdiction having demolition regulations or ordinances no less restrictive than those of this rule may be exempted from the provisions of this section. Such local ordinance or regulation must be filed with and approved by the Department before an exemption from these rules may be issued. Any authority having such local jurisdiction shall annually submit to the Department a list of all sources subject to this section operating within the local jurisdictional area and a list of those sources observed by the local authority during demolition operations.]

(A) Remove friable asbestos materials before any wrecking or dismantling that would break up the materials or preclude access to the materials for subsequent removal. However, friable asbestos materials need not be removed before demolition if:

(i) They are on a facility component that is encased in concrete or other similar material; and
(ii) These materials are adequately wetted whenever exposed during demolition.
(B) Adequately wet friable asbestos materials when they are being removed. In renovation, maintenance, repair, and construction operations, wetting that would unavoidably damage equipment is not required if the owner or operator:
(i) Demonstrates to the Department that wetting would unavoidably damage equipment, and
(ii) Uses a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the asbestos abatement project.
(C) When a facility component covered or coated with friable asbestos materials is being taken out of the facility as units or in sections:
(i) Adequately wet any friable asbestos materials exposed during cutting or disjointing operation; and
(ii) Carefully lower the units or sections to ground level, not dropping them or throwing them.
(D) For friable asbestos materials being removed or stripped
(i) Adequately wet the materials to ensure that they remain wet until they are disposed of in accordance with OAR 340-25-465(10); and
(ii) Carefully lower the materials to the ground or a lower floor, not dropping or throwing them; and

(iii) Transport the materials to the ground via dust-tight chutes or containers if they have been removed or stripped more than 50 feet above ground level and were not removed as units or in sections.

(E) If a facility is being demolished under an order of the State or a local governmental agency, issued because the facility is structurally unsound and in danger of imminent collapse, the requirements of subsections (b)(A) through (D) of this section shall not apply, provided that the portion of the facility that contains friable asbestos materials in adequately wetted during the wrecking operation.

(F) Work practices and engineering controls employed on-site during the performance of full-scale asbestos abatement projects and small-scale asbestos abatement projects by contractors and/or workers who are not otherwise subject to the requirements of the Oregon Department of Insurance and Finance, Accident Prevention Division, shall be in compliance with those specified in OAR Chapter 437, Division 83 (Construction) and OAR Chapter 437, Division 115 (Asbestos).

(G) Contractors licensed and workers certified to conduct only small-scale asbestos abatement projects under OAR 340-33 may use only those work practices and engineering controls specified by OAR 437-83 Appendix G (Asbestos) unless the Department authorizes other methods on a case-by-case basis.

(H) The Director or the Director's designee may approve, on a case-by-case basis, requests to use an alternative to a specific worker or public health protection requirement as provided by these rules for an asbestos abatement project. The contractor or facility owner or operator must submit in advance a written description of the alternative procedure which demonstrates to the Director's, or designee's, satisfaction that the proposed alternative procedure provides worker and public health protection equivalent to the protection that would be provided by the specific provision, or that such level of protection cannot be obtained for the asbestos abatement project.

(5) Spraying:

(a) No person shall cause to be discharged into the atmosphere any visible emissions from any spray-on application of materials containing more than one (1) percent asbestos on a dry weight basis used to insulate or fireproof equipment or machinery, except as provided in section (7) of this rule. Spray-on materials used to insulate or fireproof buildings, structures, pipes, and conduits shall contain less than one (1) percent asbestos on a dry weight basis. In the case of any city or area of local jurisdiction having ordinances or regulations for spray application materials more stringent than those in this section, the provisions of such ordinances or regulations shall apply.

(b) Any person intending to spray asbestos materials to insulate or fireproof buildings, structures, pipes, conduits, equipment, or machinery shall report such intention to the Department prior to the commencement of the spraying eration. Such report shall contain the following information:

(A) Name and address of person intending to conduct the spraying operation.

(B) Address or location of the spraying operation.

(C) The name and address of the owner of the facility being sprayed.

(c) The spray-on application of materials in which the asbestos fibers are encapsulated with a bituminous or resinous binder during spraying and which are not friable after drying is exempted from the requirements of subsections (5)(a) and (b) of this rule.

(6) Options for air cleaning. Rather than meet the no visible emissions requirements of sections (1), (3), and (4) of this rule, owners and operators may elect to use methods specified in section (7) of this rule.

(7) Air cleaning. All persons electing to use air cleaning methods rather than comply with the no visible emission requirements must meet all provisions of this section:

(a) Fabric filter collection devices must be used, except as provided in subsections (b) and (c) of this section. Such devices must be operated at a pressure drop of no more than four (4) inches (10.16 cm) water gauge as measured across the filter fabric. The air flow permeability, as determined by ASTM Method D737-69, must not exceed 30 $ft.^3/min./ft.^2$ (9.144 $m^3/min./m^2$) for woven fabrics or 35 $ft.^3/min.ft.^2$ (10.67 $m^3/min./m^2$) for felted fabrics with the exception that airflow permeability for 40 $ft.^3/min./ft.^2$ (12.19 $m^3/min./m^2$) for woven and 45 $ft.^3/min./ft.^2$ (13.72 $m^3/min./m^2$) for felted fabrics shall be allowed for filtering air emissions from asbestos ore dryers. Each square yard (square meter) of felted fabric must weigh at least 14 ounces (396.9 grams) and be at least one-sixteenth (1/16) inch (1.50 mm) thick throughout. Any synthetic fabrics used must not contain fill yarn other than that which is spun.

(b) If the use of fabric filters creates a fire or explosion hazard, the Department may authorize the use of wet collectors designed to operate with a unit contacting energy of at least forty (40) inches (101.6 cm) of water gauge pressure.

(c) The Department may authorize the use of filtering equipment other than that described in subsections (7)(a) and (b) of this rule if such filtering equipment is satisfactorily demonstrated to provide filtering of asbestos material equivalent to that of the described equipment.

(d) All air cleaning devices authorized by this section must be properly installed, operated, and maintained. Devices to bypass the air cleaning equipment may be used only during upset and emergency conditions, and then only for such time as is necessary to shut down the operation generating the particulate asbestos material.

(e) All persons operating any existing source using air cleaning devices shall, within ninety (90) days of the effective date of these rules, provide the following information to the Department:

(A) A description of the emission control equipment used for each process.

(B) If a fabric is utilized, the following information shall be reported:

(i) The pressure drop across the fabric filter in inches water gauge and the airflow permeability in ft.^{3}/min./ft.^{2} (m^3/min./m^2).

(ii) For woven fabrics, indicate whether the fill yarn is spun or not spun.

(iii) For felted fabrics, the density in ounces/yard^3 (gms/m^3) and the minimum thickness in inches (centimeters).

(C) If a wet collector is used the unit contact energy shall be reported in inches of pressure, water gauge.

(D) All reported information shall accompany the information required in paragraph 340-25-460(5)(a)(E).

(8) Fabricating: No person shall cause to be discharged into the atmosphere any visible emissions except as provided in section (7) of this rule, from any fabricating operations including the following, if they use commercial asbestos or, from any building or structure in which such operations are conducted.

(a) The fabrication of cement building products.

(b) The fabrication of friction products, except those operations that primarily install asbestos friction materials on motor vehicles.

(c) The fabrication of cement or silicate board for ventilation hoods; ovens; electrical panels; laboratory furniture; bulkheads, partitions and ceilings for marine construction; and flow control devices for the molten metal industry.

(9) Insulation: Molded insulating materials which are friable and wet-applied insulating materials which are friable after drying, installed after the effective date of these regulations, shall contain no commercial asbestos. The provisions of this section do not apply to insulating materials which are spray applied: such materials are regulated under section (3) of this rule.

(10) [Waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations:] Disposal of asbestos-containing waste material: The owner or operator of any source covered under the provisions of sections (3), (4), (5), or (8) of this rule or any other source of asbestos-containing waste material shall meet the following standards:

(a) There shall be no visible emissions to the outside air, except as provided in subsection (10)(c) of this section, during the collection; processing, including incineration; packaging; transporting; or deposition of any asbestos-containing waste material which is generated by such source.

(b) All asbestos-containing waste material shall be disposed of at a disposal site authorized by the Department.

(A) Persons intending to dispose of [waste-containing] asbestos-containing waste material shall notify the landfill operator of the type and volume of the waste material and obtain the approval of the landfill operator prior to bringing the waste to the disposal site.

(B) All [waste-containing] asbestos-containing waste material shall be wetted and stored and transported to the authorized disposal site in leak-tight containers such as two plastic bags each with a minimum of a thickness of 6 mil., or fiber or metal drums.

(C) The waste transporter shall immediately notify the landfill operator upon arrival of the waste at the disposal site. Off-loading of [waste-containing] asbestos-containing waste material shall be done under the direction and supervision of the landfill operator.

(D) Off-loading of [waste-containing] asbestos-containing waste material shall occur at the immediate location where the waste is to be buried. The waste burial site shall be selected in an area of minimal work activity that is not subject to future excavation.

(E) Off-loading of [waste-containing] asbestos-containing waste material shall be accomplished in a manner that prevents the leak-tight transfer containers from rupturing and prevents visible emissions to the air.

(F) [Immediately after waste-containing a]Asbestos-containing waste material [is] deposited at a disposal site [, it] shall be covered with at least 2 feet of soil or 1 foot of soil plus 1 foot of other waste before compacting equipment runs over it but not later than the end of the operating day. [If other waste is used to cover the asbestos-containing material prior to compaction, the disposal area shall be covered with 1 foot of soil before the end of the operating day.]

(c) Rather than meet the requirements of this section, an owner or operator may elect to use an alternative disposal method which has received prior approval by the Department in writing.

(d)(A) All asbestos-containing waste material shall be sealed into containers labeled with a warning label that states:

[Caution

Contains Asbestos
Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous to Your Health]

DANGER

Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard
Avoid Breathing Airborne
Asbestos Fibers

(B) Alternatively, warning labels specified by [Occupational Safety and Health Standards of the Department of Labor, Occupational Safety and Health Administration (OSHA) under 29 CFR 1910-93a(g)(2)(ii) may be used, or its Oregon State equivalent OAR 437-115-040(2)(b).] the U.S. Environmental Protection Agency under 40 CFR 61.152(b)(1)(iv) (3/10/86) may be used.

[(e)](11) Open storage or accumulation of friable asbestos material or asbestos-containing waste material is prohibited.

[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the office of the Department of Environmental Quality in Portland.]

Stat. Auth.: ORS Ch. 468
Hist: DEQ 96, f. 9-2-75; DEQ 22-1982, f. & Ef. 10-21-82

AP1201.1

(February, 1983)

OREGON ADMINISTRATIVE RULES
CHAPTER 340, DIVISION 25 - DEPARTMENT OF ENVIRONMENTAL QUALITY

ASBESTOS ABATEMENT REQUIREMENTS
excerpted from
Emission Standards and Procedural
Requirements for Hazardous Air Contaminants

Policy

340-25-450 The Commission finds and declares that certain air contaminants for which there is no ambient air standard may cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness, and are therefore considered to be hazardous air contaminants. Air contaminants currently considered to be in this category are asbestos, beryllium, and mercury. Additional air contaminants may be added to this category provided that no ambient air standard exists for the contaminant, and evidence is presented which demonstrates that the particular contaminant may be considered as hazardous. It is hereby declared the policy of the Department that the standards contained herein and applicable to operators are to be minimum standards, and as technology advances, conditions warrant, and Department or regional authority rules require or permit, more stringent standards shall be applied.

Definitions

340-25-455 As used in this rule, and unless otherwise required by context:

(1) "Asbestos" means...the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite."

(2) "Asbestos-containing waste material" means any waste which contains commercial asbestos and is generated by a source subject to the provisions of this subpart, or friable asbestos material including, but not limited to, asbestos mill tailings, control device asbestos waste, friable asbestos waste material, asbestos abatement project waste, and bags or containers that previously contained commercial asbestos.

(3) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or disposal of any material with the potential of releasing asbestos fibers from asbestos-containing material into the air."

NOTE: an asbestos abatement project is not considered to be a source under OAR 340-25-460(2) through (6). Emergency fire fighting is not an asbestos abatement project.

(5) "Asbestos-containing material" means asbestos or any material

containing at least 1% asbestos by weight, including particulate asbestos material.

(12) "Commercial asbestos" means any variety of asbestos which is produced by extracting asbestos from asbestos ore.

(13) "Commission" means the Environmental Quality Commission.

(14) "Demolition" means the wrecking or removal of any structural member of a facility together with related handling operations.

(15) "Department" means the Department of Environmental Quality.

(16) "Director" means the Director of the Department or regional authority and authorized deputies or officers.

(17) "Facility" means all or part of any public or private building, structure, installation, equipment, or vehicle or vessel, including but not limited to ships.

(18) "Friable asbestos material" means any asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry."

(19) "HEPA filter" means a high efficiency particulate air filter capable of filtering 0.3 micron particles with 99.97 percent efficiency.

(20) "Hazardous air contaminant" means any air contaminant considered by the Department or Commission to cause or contribute to an identifiable and significant increase in mortality or to an increase in serious irreversible or incapacitating reversible illness and for which no ambient air standard exists.

(25) "Particulate asbestos material" means any finely divided particles of asbestos material.

(26) "Person" means any individual, corporation, association, firm, partnership, joint stock company, public and municipal corporation, political sub-division, the state and agency thereof, and the federal government and any agency thereof.

(29) "Regional authority" means any regional air quality control authority established under the provisions of ORS 468.505.

(30) "Renovation" means altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or removed are excluded.

(31) "Small-scale asbestos abatement project" means any asbestos abatement project which meets the definition given in OAR 340-33-020(17).

(33) "Structural member" means any load-supporting member of a facility, such as beams and load-supporting walls; or any non-supporting member, such as ceilings and non-load-supporting walls.

340-25-460(1) Applicability. The provisions of these rules shall apply to any source which emits air contaminants for which a hazardous air contaminant standard is prescribed. Compliance with the provisions of these rules shall not relieve the source from compliance with other applicable rules of the Oregon Administrative Rules, Chapter 340, or with applicable provisions of the Oregon Clean Air Implementation Plan.

(7) Delegation of authority. The Commission may, when any regional authority requests and provides evidence demonstrating its capability to carry out the provisions of these rules relating to hazardous contaminants, authorize and confer jurisdiction within its boundary until such authority and jurisdiction shall be withdrawn for cause by the Commission.

Emission Standards and Procedural Requirements for Asbestos

340-25-465 (4) Asbestos abatement projects. All persons intending to conduct or provide for the conduct of an asbestos abatement project shall comply with the requirements set forth in OAR 340-25-465(5), (6), and (7). The following asbestos abatement projects are exempt from these requirements:

(a) Asbestos abatement conducted in a private residence which is occupied by the owner and the owner-occupant performs the asbestos abatement.

(b) Removal of vinyl asbestos floor tile that is not attached by asbestos-containing cement, exterior asbestos roofing shingles, exterior asbestos siding, asbestos-containing cement pipes and sheets, and other materials approved by the Department provided that the materials are not caused to become friable or to release asbestos fibers. Precautions taken to ensure that this exemption is maintained may include but are not limited to:

(A) Asbestos-containing materials are not sanded, or power sawn or drilled;

(B) Asbestos-containing materials are removed in the largest sections practicable and carefully lowered to the ground;

(C) Asbestos-containing materials are handled carefully to minimize breakage throughout removal, handling, and transport to an authorized disposal site.

(D) Asbestos-containing materials are wetted prior to removal and during subsequent handling, to the extent practicable.

(c) Removal of less than 0.5 square feet of friable asbestos-containing material provided that the removal of asbestos is not the primary objective and the following conditions are met:

(A) The generation of particulate asbestos material is minimized.

(B) No vacuuming or local exhaust ventilation and collection is conducted with equipment having a collection efficiency lower than that of a HEPA filter.

(C) All asbestos-containing waste materials shall be cleaned up using HEPA filters or wet methods.

(D) Asbestos-containing materials is wetted prior to removal and during subsequent handling, to the extent practicable.

(E) An asbestos abatement project shall not be subdivided into smaller sized units in order to qualify for this exemption.

(d) Removal of asbestos-containing materials which are sealed from the atmosphere by a rigid casing, provided that the casing is not broken or otherwise altered such that asbestos fibers could be released during removal, handling, and transport to an authorized disposal site.

Note: The requirements and jurisdiction of the Department of Insurance and Finance, Accident Prevention Division and any other state agency are not affected by these rules.

(5) Notification Requirements. Written notification of any asbestos abatement project shall be provided to the Department on a Department form. The notification must be submitted by the facility owner or operator or by the contractor in accordance with one of the procedures specified in subsection (a), (b), or (c) below except as provided in subsections (e), (f), and (g) below.

(a) Submit the notifications as specified in subsection (d) below and the project notification fee to the Department at least ten days before beginning any asbestos abatement project.

(A) The project notification fee shall be:

(i) Twenty-five dollars ($25) for each small-scale asbestos abatement project.

(ii) Fifty dollars ($50) for each project greater than a small-scale asbestos abatement project and less than 260 linear feet or 160 square feet.

(iii) Two-hundred dollars ($200) for each project greater than 260 linear feet or 160 square feet, and less than 2600 linear feet or 1600 square feet.

(iv) Five hundred dollars ($500) for each project greater than 2600 linear feet or 1600 square feet.

(B) Project notification fees shall be payable with the completed project notification form. No notification will be considered to have occurred until the notification fee is submitted.

(C) Notification of less than ten days is permitted in case of an emergency involving protection of life, health or property. Notification shall include the information contained in subsection (d) below, and the date of the contract if applicable. If original notification is provided by phone, written notification and the project notification fee shall be submitted within three (3) days after the start of the emergency abatement.

(D) The Department must be notified prior to any changes in the scheduled starting or completion dates or other substantial changes or the notification will be void.

(b) For small-scale asbestos abatement projects conducted at one facility, the notification may be submitted as follows:

(A) Establish eligibility for use of this notification procedure with the Department prior to use;

(B) Maintain on file with the Department a general asbestos abatement plan. The plan shall contain the information specified in subsections (d)(A) through (d)(I) below, to the extent possible;

(C) Provide to the Department a summary report of all small-scale asbestos abatement projects conducted at the facility in the previous three months by the 15th day of the month following the end of the calendar quarter. The summary report shall include the information specified in subsections (d)(J) through (d)(M) below for each project, a description of any significant variations from the general asbestos abatement plan; and a description of asbestos abatement projects anticipated for the next quarter;

(D) Submit a project notification fee of two-hundred dollars per year ($200/year) prior to use of this notification procedure and annually thereafter while this procedure is in use.

(E) Failure to provide payment for use of this notification procedure shall void the general asbestos abatement plan and each subsequent abatement project shall be individually assessed a project notification fee.

(c) For small-scale asbestos abatement projects conducted by a contractor at one or more facilities, the notification may be submitted as follows:

(A) Establish eligibility for use of this procedure with the Department prior to use;

(B) Maintain on file with the Department a general asbestos abatement plan containing the information specified in subsections (d)(A) through (d)(G), to the extent possible;

(C) Provide to the Department a monthly summary of all small-scale projects performed by the 15th day of the following month including the information specified in subsections (d)(H) through (d)(M) below and a description of any significant variations from the general asbestos abatement plan for each project;

(D) Provide to the Department, upon request, a list of asbestos abatement projects which are scheduled or are being conducted at the time of the request; and

(E) Submit a notification fee of $25 per monthly summary prior to the use of this notification procedure.

(F) Failure to provide payment for use of this notification procedure shall void the general asbestos abatement plan and each subsequent abatement project shall be individually assessed a project notification fee.

(d) The following information shall be provided for each notification:

(A) Name and address of person intending to engage in asbestos abatement.

(B) Contractor's Oregon asbestos abatement license number, if applicable, and certification number of the supervisor for full-scale asbestos abatement or certification number of the trained worker for a project which does not have a certified supervisor.

(C) Method of asbestos abatement to be employed.

(D) Procedures to be employed to insure compliance with OAR 340-25-465.

(E) Names, addresses, and phone numbers of waste transporters.

(F) Name and address or location of the waste disposal site where the asbestos-containing waste material will be deposited.

(G) Description of asbestos disposal procedure.

(H) Description of building, structure, facility, installation, vehicle, or vessel to be demolished or renovated, including address or location where the asbestos abatement project is to be accomplished.

(I) Facility owner's or operator's name, address and phone number.

(J) Scheduled starting and completion dates of asbestos abatement work.

(K) Description of the asbestos type, approximate asbestos content (percent), and location of the asbestos-containing material.

(L) Amount of asbestos to be abated: linear feet, square feet, thickness.

(M) Any other information requested on the Department form.

(e) No project notification fee shall be assessed for asbestos abatement projects conducted in the following residential buildings: site-built homes, modular homes constructed off site, condominium units, mobile homes, and duplexes or other multi-unit residential buildings consisting of four units or less. Project notification for a full-scale asbestos abatement project, as defined in OAR 340-33-020(14), in any of these residential buildings shall otherwise be in accordance with subsection (5)(a) of this section. Project notification for a small-scale asbestos abatement project, as defined in OAR 340-33-020(17), in any of these residential buildings is not required.

(f) The project notification fees specified in this section shall be increased by 50% when an asbestos abatement project is commenced without filing of a project notification and/or submittal of a notification fee.

(g) The Director may waive part or all of a project notification fee. Requests for waiver of fees shall be made in writing to the Director, on a case-by-case basis, and be based upon financial hardship. Applicants for waivers must describe the reason for the request and certify financial hardship.

(h) Pursuant to ORS 468.535, a regional authority may adopt project notification fees for asbestos abatement projects in different amounts than are set forth in this rule. The fees shall be based upon the costs of the regional authority in carrying out the delegated asbestos program. The regional authority may collect, retain, and expend such project notification fees for asbestos abatement projects within its jurisdiction.

(6) Work practices and procedures. The following procedures shall be employed during an asbestos abatement project to prevent emissions of particulate asbestos material into the ambient air:

(a) Remove friable asbestos materials before any wrecking or dismantling that would break up the materials or preclude access to the materials for subsequent removal. However, friable asbestos materials need not be removed before demolition if:

(A) They are on a facility component that is encased in concrete or other similar material; and

(B) These materials are adequately wetted whenever exposed during demolition.

(b) Adequately wet friable asbestos materials when they are being removed. In renovation, maintenance, repair, and construction operations, wetting that would unavoidably damage equipment is not required if the owner or operator:

(A) Demonstrates to the Department that wetting would unavoidably damage equipment, and

(B) Uses a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the asbestos abatement project.

(c) When a facility component covered or coated with friable asbestos materials is being taken out of the facility as units or in sections:

(A) Adequately wet any friable asbestos materials exposed during cutting or disjointing operation; and

(B) Carefully lower the units or sections to ground level, not dropping them or throwing them.

(d) For friable asbestos materials being removed or stripped:

(A) Adequately wet the materials to ensure that they remain wet until they are disposed of in accordance with OAR 340-25-465(13); and

(B) Carefully lower the materials to the floor, not dropping or throwing them; and

(C) Transport the materials to the ground via dust-tight chutes or containers if they have been removed or stripped above ground level and were not removed as units or in sections.

(e) If a facility is being demolished under an order of the State or a local governmental agency, issued because the facility is structurally unsound and in danger of imminent collapse, the requirements of subsections (a), (b), (c), (d), and (f) of this section shall not apply, provided that the portion of the facility that contains friable asbestos materials is adequately wetted during the wrecking operation.

(f) None of the operations in subsections (a) through (d) of this section shall cause any visible emissions. Any local exhaust ventilation and collection system or other vacuuming equipment used during an asbestos abatement project, shall be equipped with a HEPA filter or other filter of equal or greater collection efficiency.

(g) Contractors licensed and workers certified to conduct only small-scale asbestos abatement projects under OAR 340-33 may use only those work practices and engineering controls specified by OAR 437 Appendix 83-G (Asbestos) (9/17/87) unless the Department authorizes other methods on a case-by-case basis.

(h) The Director may approve, on a case-by-case basis, requests to use an alternative to a specific worker or public health protection requirement as provided by these rules for an asbestos abatement project. The contractor or facility owner or operator must submit in advance a written description of the alternative procedure which demonstrates to the Director's satisfaction that the proposed alternative procedure provides worker and public health protection equivalent to the protection that would be provided by the specific provision, or that such level of protection cannot be obtained for the asbestos abatement project.

(7) Related Work Practices and Controls
Work practices and engineering controls employed for asbestos abatement projects by contractors and/or workers who are not otherwise subject to the requirements of the Oregon Department of Insurance and Finance, Accident Prevention Division shall comply with the subsections of OAR Chapter 437 Division 83 which limit the release of asbestos-containing material or exposure of other persons. As used in this subsection the term employer shall mean the operator of the asbestos abatement project and the term employee shall mean any other person.

(13) Disposal of asbestos-containing waste material: The owner or operator of any source covered under the provisions of sections (3), (4), (8) or (11) of this rule or any other source of friable asbestos-containing waste material shall meet the following standards.

(a) There shall be no visible emissions to the outside air, except as provided in subsection (13)(c) of this section, during the collection; processing, including incineration; packaging; transporting; or deposition of any asbestos-containing waste material which is generated by such source.

(b) All asbestos-containing waste material shall be disposed of at a disposal site authorized by the Department. Records of disposal at an authorized landfill shall be maintained by the source for a minimum of three years and shall be made available upon request to the Department. For an asbestos abatement project conducted by a contractor licensed under OAR 340-33-040, the records shall be retained by the licensed contractor. For any other asbestos abatement project, the records shall be retained by the facility owner.

(A) Persons intending to dispose of asbestos-containing waste material shall notify the landfill operator of the type and volume of the waste material and obtain the approval of the landfill operator prior to bringing the waste to the disposal site.

(B) All asbestos-containing waste material shall be wetted and stored and transported to the authorized disposal site in leak-tight containers such as two plastic bags each with a minimum of a thickness of 6 mil., or fiber or metal drums.

(C) The waste transporter shall immediately notify the landfill operator upon arrival of the waste at the disposal site. Off-loading of asbestos-containing waste material shall be done under the direction and supervision of the landfill operator.

(D) Off-loading of asbestos-containing waste material shall occur at the immediate location where the waste is to be buried. The waste burial site shall be selected in an area of minimal work activity that is not subject to future excavation.

(E) Off-loading of asbestos-containing waste material shall be accomplished in a manner that prevents the leak-tight transfer containers from rupturing and prevents visible emissions to the air.

(F) Asbestos-containing waste material deposited at a disposal site shall be covered with at least 2 feet of soil or 1 foot of soil plus 1 foot of other waste before compacting equipment runs over it but not later than the end of the operating day.

(c) Rather than meet the requirements of this section, an owner or operator may elect to use an alternative disposal method which has received prior approval by the Department in writing.

(d)(A) All asbestos-containing waste material shall be sealed into containers labeled with a warning label that states:

DANGER

Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard
Avoid Breathing Airborne
Asbestos Fibers

(B) Alternatively, warning labels specified by the U.S. Environmental Protection Agency under 40 CFR 61.152(b)(1)(iv) (3/10/86) may be used.

(14) Any waste which contains nonfriable asbestos-containing material and which is not subject to subsection (13) of this rule shall be handled and disposed of using methods that will prevent the release of airborne asbestos-containing material.

(15) Open storage or accumulation of friable asbestos material or asbestos-containing waste material is prohibited.

AP1201.3

OREGON ADMINISTRATIVE RULES
LICENSING AND CERTIFICATION REQUIREMENTS

ASBESTOS REQUIREMENTS

AUTHORITY, PURPOSE, & SCOPE

340-33-010 (1) Authority. These rules are promulgated in accordance with and under the authority of ORS 468.893.

(2) Purpose. The purpose of these rules is to provide reasonable standards for:

(a) training and licensing of asbestos abatement project contractors,

(b) training and certification of asbestos abatement project supervisors and workers,

(c) accreditation of providers of training of asbestos contractors, supervisors, and workers,

(d) administration and enforcement of these rules by the Department.

(3) Scope

(a) OAR 340-33-000 through -100 is applicable to all work, including demolition, renovation, repair, construction, or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling, or disposal of any material which could potentially release asbestos fibers into the air; except as provided in (b) and (c) below.

(b) OAR 340-33-000 through -100 do not apply to an asbestos abatement project which is exempt from OAR 340-25-465(4).

(c) OAR 340-33-010 through -100 do not apply to persons performing vehicle brake and clutch maintenance or repair.

(d) Full-scale asbestos abatement projects are differentiated from smaller projects. Small-scale asbestos abatement projects as defined by OAR 340-33-020(17) are limited by job size and include projects,

(A) where the primary intent is to disturb the asbestos-containing material and prescribed work practices are used, and

(B) where the primary intent is not to disturb the asbestos-containing material.

(e) OAR 340-33-000 through -100 provide training, licensing, and certification standards for implementation of OAR 340-25-465, Emission Standards and Procedural Requirements for Asbestos.

DEFINITIONS

340-33-020 As used in these rules,

(1) "Accredited" means a provider of asbestos abatement training courses is authorized by the Department to offer training courses that satisfy requirements for contractor licensing and worker training.

(2) "Agent" means an individual who works on an asbestos abatement project for a contractor but is not an employe of the contractor.

(3) "Asbestos" means the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

(4) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or

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disposal of any asbestos-containing material with the potential of releasing asbestos fibers from asbestos containing material into the air.

> Note: Emergency fire fighting is not an asbestos abatement project.

(5) "Asbestos-containing material" means any material containing more than one percent asbestos by weight, including particulate asbestos material.

(6) "Certified" means a worker has met the Department's training, experience, and/or quality control requirements and has a current certification card.

(7) "Contractor" means a person that undertakes for compensation an asbestos abatement project for another person. As used in this subsection, "compensation" means wages, salaries, commissions and any other form of remuneration paid to a person for personal services.

(8) "Commission" means the Environmental Quality Commission.

(9) "Department" means the Department of Environmental Quality.

(10) "Director" means the Director of the Department of Environmental Quality.

(11) "EPA" means the United States Environmental Protection Agency.

(12) "Facility" means all or part of any public or private building, structure, installation, equipment, or vehicle or vessel, including but not limited to ships.

(13) "Friable asbestos material" means any asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry.

(14) "Full-scale asbestos abatement project" means any removal, renovation, encapsulation, repair or maintenance of any asbestos-containing material which could potentially release asbestos fibers into the air, and which is not classified as a small-scale project as defined by (17) below.

(15) "Licensed" means a contracting entity has met the Department's training, experience, and/or quality control requirements to offer and perform asbestos abatement projects and has a current asbestos abatement contractor license.

(16) "Persons" means an individual, public or private corporation, nonprofit corporation, association, firm, partnership, joint venture, business trust, joint stock company, municipal corporation, political subdivision, the state and any agency of the state or any other entity, public or private, however organized.

(17) "Small-scale asbestos abatement project" means small-scale, short-duration projects as defined by (18) below, and/or removal, renovation, encapsulation, repair, or maintenance procedures intended to prevent asbestos containing material from releasing fibers into the air and which:

(a) Remove, encapsulate, repair or maintain less than 40 linear feet or 80 square feet of asbestos-containing material;

(b) Do not subdivide an otherwise full-scale asbestos abatement project into smaller sized units in order to avoid the requirements of these rules;

(c) Utilize all practical worker isolation techniques and other control measures; and

(d) Do not result in worker exposure to an airborne concentration of asbestos in excess of 0.1 fibers per cubic centimeter of air calculated as an eight (8) hour time weighted average.

(18) "Small-scale, short-duration renovating and maintenance activity"

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means a task for which the removal of asbestos is not the primary objective of the job, including, but not limited to:

(a) Removal of quantities of asbestos-containing insulation on pipes;

(b) Removal of small quantities of asbestos-containing insulation on beams or above ceilings;

(c) Replacement of an asbestos-containing gasket on a valve;

(d) Installation or removal of a small section of drywall; or

(e) Installation of electrical conduits through or proximate to asbestos -containing materials.

Small-scale, short duration activities shall be limited to no more than 40 linear feet or 80 square feet of asbestos containing material. An asbestos abatement activity that would otherwise qualify as a full-scale abatement project shall not be subdivided into smaller units in order to avoid the requirements of these rules.

(19) "Trained worker" means a person who has successfully completed specified training and can demonstrate knowledge of the health and safety aspects of working with asbestos.

(20) "Worker" means an employe or agent of a contractor or facility owner or operator.

GENERAL PROVISIONS

340-33-030 (1) Persons engaged in the removal, encapsulation, repair, or enclosure of any asbestos-containing material which has the potential of releasing asbestos fibers into the air must be licensed or certified, unless exempted by OAR 340-33-010(3).

(2) An owner or operator of a facility shall not allow any persons other than those employees of the facility owner or operator who are appropriately certified or a licensed asbestos abatement contractor to perform an asbestos abatement project in or on that facility. Facility owners and operators are not required to be licensed to perform asbestos abatement projects in or on their own facilities.

(3) Any contractor engaged in a full-scale asbestos abatement project must be licensed by the Department under the provisions of OAR 340-33-040.

(4) Any person acting as the supervisor of any full-scale asbestos abatement project must be certified by the Department as a Supervisor for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050.

(5) Any worker engaged in or working on any full-scale asbestos abatement project must be certified by the Department as a Worker for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050, or as a Supervisor for Full-Scale Asbestos Abatement.

(6) Any contractor or worker engaged in any small-scale asbestos abatement project but not licensed or certified to perform full-scale asbestos abatement projects, must be licensed or certified by the Department as a Small-Scale Asbestos Abatement Contractor or a Worker for Small-Scale Asbestos Abatement, respectively under the provisions of OAR 340-33-040 and -050.

(7) Any provider of training which is intended to satisfy the licensing and certification training requirements of these rules must be accredited by the Department under the provisions of OAR 340-33-060.

(8) Any person licensed, certified, or accredited by the Department under the provisions of these rules shall comply with the appropriate provisions of OAR 340-25-465 and OAR 340-33-000 through -100 and maintain a current address on

file with the Department, or be subject to suspension or revocation of license, or certification, or accreditation.

(9) Asbestos abatement contractors and workers may perform asbestos abatement projects without a license or certificate until January 1, 1989. Thereafter, any contractor or worker engaged in an asbestos abatement project must be licensed or certified by the Department.

(10) The Department may accept evidence of violations of these rules from representatives of other federal, state, or local agencies.

(11) A regional air pollution authority which has been delegated authority under OAR 340-25-460(7) may inspect for and enforce against violations of licensing and certification regulations. A regional air pollution authority may not approve, deny, suspend or revoke a training provider accreditation, contractor license, or worker certification, but may refer violations to the Department and recommend denials, suspensions, or revocations.

(12) An extension of time beyond January 1, 1989, for mandatory contractor licensing, supervisor certification or worker certification may be approved by the Commission if:

(a) Adequate accredited training as required for any of the categories of licensing or certification is not available in the State, and

(b) There is a public health or worker danger created due to inadequate numbers of appropriately licensed or certified persons to properly perform asbestos abatement activities.

(13) Variances from these rules may be granted by the Commission under ORS 468.345.

CONTRACTOR LICENSING

340-33-040 (1) Contractors may be licensed to perform either of the following categories of asbestos abatement projects:

(a) Full-Scale Asbestos Abatement Contractors: All asbestos abatement projects, regardless of project size or duration, or

(b) Small-Scale Asbestos Abatement Contractor: Small-scale asbestos abatement projects.

(2) Application for licenses shall be submitted on forms prescribed by the Department and shall be accompanied by:

(a) Documentation that the contractor, or contractor's employee representative, is certified at the appropriate level by the Department:

(A) Full-scale Asbestos Abatement Contractor license: Certified Supervisor for Full-Scale Asbestos Abatement.

(B) Small-Scale Asbestos Abatement Contractor: Certified Worker for Small-Scale Asbestos Abatement.

(b) Certification that the contractor has read and understands the applicable Oregon and federal rules and regulations on asbestos abatement and agrees to comply with the rules and regulations.

(c) A list of all certificates or licenses, issued to the contractor by any other jurisdiction, that have been suspended or revoked during the past one (1) year, and a list of any asbestos-related enforcement actions taken against the contractor during the past one (1) year.

(d) List any additional project supervisors for full-scale projects and their certification numbers as Supervisors for Full-Scale Asbestos Abatement.

(e) Summary of asbestos abatement projects conducted by the contractor during the past 12 months.

(f) A license application fee.

(3) The Department will review the application for completeness. If the application is incomplete, the Department shall notify the applicant in writing of the deficiencies.

(4) The Department shall deny, in writing, a license to a contractor who has not satisfied the license application requirements.

(5) The Department shall issue a license to the applicant after the license is approved.

(6) The Department shall grant a license for a period of 12 months. Licenses may be extended during Department review of a renewal application.

(7) Renewals:

(a) License renewals must be applied for in the same manner as is required for an initial license.

(b) For renewal, the contractor or employee representative must have completed at least the appropriate annual refresher course.

(c) The complete renewal application shall be submitted no later than 60 days prior to the expiration date.

(8) The Department may suspend or revoke a license if the licensee:

(a) Fraudulently obtains or attempts to obtain a license.

(b) Fails at any time to satisfy the qualifications for a license or comply with the rules adopted by the Commission.

(c) Fails to meet any applicable state or federal standard relating to asbestos abatement.

(d) Permits an untrained or uncertified worker to work on an asbestos abatement project.

(e) Employs a worker who fails to comply with applicable state or federal rules or regulations relating to asbestos abatement.

(9) A contractor who has a license revoked may reapply for a license after demonstrating to the Department that the cause of the revocation has been resolved.

CERTIFICATION

340-33-050 (1) Workers on asbestos abatement projects shall be certified at one or more of the following levels:

(a) Certified Supervisor for Full-Scale Asbestos Abatement.

(b) Certified Worker for Full-Scale Asbestos Abatement.

(c) Certified Worker for Small-Scale Asbestos Abatement.

(2) Application for Certification-General Requirements.

(a) Applications shall be submitted to the provider of the accredited training course within thirty (30) days of completion of the course.

(b) Applications shall be submitted on forms prescribed by the Department and shall be accompanied by the certification fee.

(3) Application to be a Certified Supervisor for Full-Scale Asbestos Abatement shall include:

(a) Documentation that the applicant has successfully completed the Supervisor for Full-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document, and

(b) Documentation that the applicant has been certified as a Worker for Full-Scale Asbestos Abatement and has at least 3 months of full-scale asbestos abatement experience, including time on powered air purifying respirators and experience on at least five separate asbestos abatement projects. The Department shall have the authority to determine if any applicant's experience satisfies

those requirements. Applications for licenses submitted prior to January 1, 1989 shall not be required to include documentation of certification as a worker.

(4) Application to be a Certified Worker for Asbestos Abatement shall include:

(a) Documentation that the applicant to be a Certified Worker for Full-Scale Asbestos Abatement has successfully completed the Worker for Full-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document.

(b) Documentation that the applicant to be a Certified Worker for Small-Scale Asbestos Abatement has successfully completed the Worker for Small-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document.

(5) Training course providers shall issue certification to an applicant who has fulfilled the requirements of certification.

(6) Certification at all levels is valid for a period of twenty-four (24) months after the date of issue.

(7) Renewals

(a) Certification renewals must be applied for in the same manner as application for original certification.

(b) To gain renewal of certification, a Worker for Full-Scale Asbestos Abatement and a Supervisor for Full-Scale Asbestos Abatement must complete the appropriate annual refresher course no sooner than nine (9) months and no later than twelve (12) months after the issuance date of the certificate, and again no sooner than three (3) months prior to the expiration date of the certificate. A worker may apply in writing to the Department for taking refresher training at some other time than as specified by this paragraph for reasons of work requirements or hardship. The Department shall accept or reject the application in writing.

(c) To gain renewal of certification, a Worker for Small-Scale Asbestos Abatement must comply with the regulations on refresher training which are in effect at the time of renewal. Completion of an accredited asbestos abatement review class may be required if the Environmental Quality Commission determines that there is a need to update the workers' training in order to meet new or changed conditions.

(8) The Department may suspend or revoke a worker's certificate for failure to comply with any state or federal asbestos abatement rule or regulation.

(9) If a certification is revoked, the worker may reapply for another initial certification only after twelve (12) months from the revocation date.

(10) A current worker certification card shall be available for inspection at each asbestos abatement project site for each worker conducting asbestos abatement activities on the site.

TRAINING PROVIDER ACCREDITATION

340-33-060 (1) General

(a) Asbestos training courses required for licensing or certification under these rules may be provided by any person.

(b) Any training provider offering training in Oregon to satisfy these certification and licensing requirements must be accredited by the Department.

(c) Each of the different training courses which are to be used to fulfill training requirements shall be individually accredited by the Department.

(d) The training provider must satisfactorily demonstrate through application and submission of course agenda, faculty resumes, training manuals, examination materials, equipment inventory, and performance during on-site course audits by Department representatives that the provider meets the minimum requirements established by the Department.

(e) The training course sponsor shall limit each class to a maximum of thirty participants unless granted an exception in writing by the Department. The student to instructor ratio for hands-on training shall be equal to or less than ten to one (10:1). To apply for an exception allowing class size to exceed thirty, the course sponsor must submit the following information in writing to the Department for evaluation and approval prior to expanding the class size.

(A) The new class size limit,

(B) The teaching methods and techniques for training the proposed larger class,

(C) The protocol for conducting the written examination, and

(D) Justification for a larger class size.

(f) Course instructors must have academic credentials, demonstrated knowledge, prior training, or field experience in their respective training roles.

(g) The Department may require any accredited training provider to use examinations developed by the Department in lieu of the examinations offered by the training provider.

(h) Training providers seeking accreditation for courses conducted since January 1, 1987, may apply for accreditation of those course offerings as though they were applying for initial accreditation. Contractors and workers trained by these providers since January 1, 1987 may be eligible to use this prior training as satisfaction of the initial training required by these licensing and certification rules.

(i) The Department may require accredited training providers to pay a fee equivalent to reasonable travel expenses for one Department representative to audit any accredited course which is not offered in the State of Oregon for compliance with these regulations. This condition shall be an addition to the standard accreditation application fee.

(2) Application for Accreditation.

(a) Application for accreditation shall be submitted to the Department in writing on forms provided by the Department and attachments. Such applications shall, as a minimum, contain the following information:

A. Name, address, telephone number of the firm, individual(s), or sponsors conducting the course, including the name under which the training provider intends to conduct the training.

B. The type of course(s) for which approval is requested.

C. A detailed course outline showing topics covered and the amount of time given to each topic, including the hands-on skill training.

D. A copy of the course manual, including all printed material to be distributed in the course.

E. A description of teaching methods to be employed, including description of audio-visual materials to be used. The Department may, at its discretion, request that copies of the materials be provided for review. Any audio-visual materials provided to the Department will be returned to the applicant.

F. A description of the hands-on facility to be utilized including protocol for instruction, number of students to be accommodated, the number of instructors, and the amount of time for hands-on skill training.

G. A description of the equipment that will be used during both classroom lectures and hands-on training.

H. A list of all personnel involved in course preparation and presentation and a description of the background, special training and qualification of each, as well as the subject matter covered by each.

I. A copy of each written examination to be given including the scoring methodology to be used in grading the examination; and a detailed statement about the development and validation of the examination.

J. A list of the tuition or other fees required.

K. A sample of the certificate of completion and certification card label.

L. A description of the procedures and policies for re-examination of students who do not successfully complete the training course examination.

M. A list of any states or accrediting systems that approve the training course.

N. A description of student evaluation methods (other than written examination to be used) associated with the hands-on skill training, as applicable.

O. A description of course evaluation methods used by students.

P. Any restriction on attendance such as class size, language, affiliation, and/or target audience of class.

Q. A description of the procedure for issuing replacement certification cards to workers who were issued a certification card or certification card label by the training provider within the previous 12 months and whose cards have been lost or destroyed.

R. Any additional information or documentation as may be required by the Department to evaluate the adequacy of the application.

S. Accreditation application fee.

(b) Application for initial training course accreditation and course materials shall be submitted to the Department at least 45 days prior to the requested approval date.

(c) Upon approval of an initial or refresher asbestos training course, the Department will issue a certificate of accreditation. The certificate is valid for one year from the date of issuance.

(d) Application for renewal of accreditation must follow the procedures described for the initial accreditation. In addition, course instructors must demonstrate that they have maintained proficiency in their instructional specialty and adult training methods during the twelve (12) months prior to renewal.

(3) Denial, Suspension or Revocation of Certificate of Accreditation. The Director may deny, revoke or suspend an application or current accreditation upon finding of sufficient cause. Applicants and certificate holders shall also be advised of the duration of suspension or revocation and any conditions that must be met before certificate reinstatement. Applicants shall have the right to appeal the Director's determination through an administrative hearing in accordance with the provisions of OAR Chapter 340 Division 11. The following may be considered grounds for denial, revocation or suspension:

(a) False statements in the application, omission of required documentation or the omission of information.

(b) Failure to provide or maintain the standards of training required by these regulations.

(c) Failure to provide minimum instruction required by these regulations.

(d) Failure to report to the Department any change in staff or program which substantially deviates from the information contained in the

application.

(e) Failure to comply with the administrative tasks and any other requirement of these regulations.

(4) Training Provider Administrative Tasks. Accredited training providers shall perform the following as a condition of accreditation:

(a) Administer the training course examination only to those students who successfully complete the training course.

(b) Issue a numbered certificate to each students who successfully passes the training course examination. Each certificate shall include the name of the student, name of the course completed, the dates of the course and the examination, name of the training provider, a unique certificate number, and a statement that the student passed the examination.

(c) Issue a photo identification card to each student seeking initial or renewal certification who successfully completes the training course examination and meets all other requirements for certification. The photo identification card shall meet the Department specifications.

(d) Place a label on the back of the photo identification card of each student who successfully completes a refresher training course and examination as required to maintain certification. The label shall meet Department specifications.

(e) Provide to the Department within ten (10) calendar days of the conclusion of each course offering the name, address, telephone number, Social Security Number, course title and dates given, attendance record, exam scores, and course evaluation form of each student attending the course and the certification number, certification fee, and a photograph for each student certified. Record of the information shall be retained by the training provider for a period of three (3) years.

(f) Obtain advance approval from the Department for any changes in the course instructional staff, content, training aids used, facility utilized or other matters which would alter the instruction from that described in the approval application.

(e) Utilize and distribute as part of the course information or training aides furnished by the Department.

(f) Notify the Department in writing at least one week before a training course is scheduled to begin. The notification must include the date, time and address where the training will be conducted.

(g) Establish and maintain course records and documents relating to course accreditation application. Accredited training providers shall make records and documents available to the Department upon request. Training providers whose principle place of business is outside of the State of Oregon shall provide a copy of such records or documents within ten (10) business days of receipt of such a written request from the Department.

(h) Notify the Department prior to issuing a replacement certification card.

(i) Accredited training providers must have their current accreditation certificates at the location where they are conducting training.

GENERAL TRAINING STANDARDS

340-33-070 (1) Courses of instruction required for certification shall be specific for each of the certificate categories and shall be in accordance with Department guidelines. The topics or subjects of instruction which a person must

receive to meet the training requirements must be presented through a combination of lectures, demonstrations, and hands-on practice.

(2) Courses requiring hands-on training must be presented in an environment suitable to permit participants to have actual experience performing tasks associated with asbestos abatement. Demonstrations not involving individual participation shall not substitute for hands-on training.

(3) Persons seeking certification as a Supervisor for Full-Scale Asbestos Abatement shall successfully complete an accredited training course of at least four days as outlined in the DEQ Asbestos Training Guidance Document. The training course shall include lectures, demonstrations, at least six hours of hands-on training, individual respirator fit testing, course review, and a written examination consisting of multiple choice questions. Successful completion of the training shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training.

(4) Any person seeking certification as a Worker for Full-Scale Asbestos Abatement shall successfully complete an accredited training course of at least three days duration as outlined in the DEQ Asbestos Training Guidance Document. The training course shall include lectures, demonstrations, at least six hours of actual hands-on training, individual respirator fit testing, course review, and an examination of multiple choice questions. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training. The course shall adequately address the following topics:

(5) Any person seeking certification as a Worker for Small-Scale Asbestos Abatement shall complete at least a two day approved training course as outlined in the DEQ Asbestos Training Guidance Document. The small-scale asbestos abatement worker course shall include lectures, demonstrations, at least six hours of hands-on training, individual respirator fit testing, course review, and an examination of multiple choice questions. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training.

(6) Refresher training shall be at least one day duration for Certified Supervisors and Workers for Full-Scale Asbestos Abatement and at least three hours duration for Certified Workers for Small-Scale Asbestos Abatement. The refresher courses shall include a review of key areas of initial training, updates, and an examination of multiple choice questions as outlined in the DEQ Asbestos Training Guidance Document. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in any hands-on training.

(7) One training day shall consist of at least seven hours, of actual classroom instruction and hands-on practice.

PRIOR TRAINING

340-33-080 Successful completion of an initial training course not accredited by the Department may be used to satisfy the training and examination requirements of OAR 340-33-050 and OAR 340-33-060 provided that all of the following conditions are met.

(1) The Department determines that the course and examination requirements are equivalent to or exceed the requirements of OAR 340-33-050 and 340-33-060 and the asbestos training guidance document, for the level of certification sought. State and local requirements may vary.

(2) If the training was completed prior to January 1, 1987, the applicant must demonstrate to the Department that additional experience sufficient to maintain knowledge and skills in asbestos abatement has been obtained in the interim.

(3) The applicant who has received recognition from the Department for alternate initial training successfully completes an Oregon accredited refresher course and refresher course examination for the level of certification sought.

RECIPROCITY

340-33-090 The Department may develop agreements with other jurisdictions for the purposes of establishing reciprocity in training, licensing, and/or certification if the Department finds that the training, licensing and/or certification standards of the other jurisdiction are at least as stringent as those required by these rules.

FEES

340-33-100 (1) Fees shall be assessed to provide revenues to operate the asbestos control program. Fees are assessed for the following:

(a) Contractor Licenses

(b) Worker Certifications

(c) Training Provider Accreditation

(d) Asbestos Abatement Project Notifications

(2) Contractors shall pay a non-refundable license application fee of:

(a) Three hundred dollars ($300) for a one year Full-Scale Asbestos Abatement Contractor license.

(b) Two hundred dollars ($200) for a one year Small-Scale Asbestos Abatement Contractor license.

(3) Workers shall pay a non-refundable certification fee of:

(a) One hundred dollars ($100) for a two year certification as a certified Supervisor for Full-Scale Asbestos Abatement.

(b) Eighty dollars ($80) for a two year certification as a Certified Worker for Full-Scale Asbestos Abatement.

(c) Fifty dollars ($50) for a two year certification as a Certified Worker for Small-Scale Asbestos Abatement.

(4) Training Providers shall pay a non-refundable accreditation application fee of:

(a) One thousand dollars ($1000) for a one year accreditation to provide a course for training supervisors on Full-Scale projects.

(b) Eight hundred dollars ($800) for a one year accreditation to provide a course for training workers on Full-Scale projects.

(c) Five hundred dollars ($500) for a one year accreditation to provide a course for training workers on Small-Scale projects.

(d) Two hundred and fifty dollars ($250) for a one year accreditation to provide a course for refresher training for any level of certification.

(5) Requests for waiver of fees shall be made in writing to the Director, on a case-by-case basis, and be based upon financial hardship. Applicants for waivers must describe the reason for the request and certify financial hardship. The Director may waive part or all of a fee.

> Note: The requirements and jurisdiction of the Department of Insurance and Finance, Accident Prevention Division and

any other state agency are not affected by these rules.

APD Admin. Order 3-1987

BEFORE THE DIRECTOR OF THE
DEPARTMENT OF INSURANCE AND FINANCE
OF THE STATE OF OREGON

FILED
SEP 17 1987
BARBARA ROBERTS
SECRETARY OF STATE

In the Matter of the Amendment of OAR Chapter 437, Oregon Occupational Safety and Health Code, Division 83, Construction, by the Amendment of Various Rules and Appendices, and the Adoption of Rule 437-83-7023, pertaining to Identification of Asbestos-Containing Material.)

ORDER OF ADOPTION

To All Interested Persons:

(1) The Director of the Department of Insurance and Finance, pursuant to the rulemaking authority in ORS 654.025(2) and ORS 656.726(3), and in accordance with the procedure provided by ORS 183.335, duly filed notice to amend OAR Chapter 437, Oregon Occupational Safety and Health Code, Division 83, Construction, by the amendment of various rules and appendices, and the adoption of Rule 437-83-7023, pertaining to the identification of asbestos-containing material. This notice was published in the Secretary of State's Administrative Rules Bulletin on September 1, 1987.

(2) The rules, as set forth in Exhibit "A," attached hereto, and hereby made a part of this order, are being amended and adopted for the following reasons:

A. The Federal Occupational Safety and Health Administration (OSHA) has made corrections to its Asbestos Standard for Construction and has extended the partial administrative stay pertaining to occupational exposure to non-asbestiform tremolite, anthophyllite, and actinolite. Oregon is required to provide equivalent protection for workers, and is therefore adopting the corrections and extending the administrative stay.

B. A definition will be added for "small scale, short duration operations." In the existing Asbestos Rules for Construction, small scale, short duration operations are discussed in Appendix 83-G, but not defined in the rules. This new provision in the rules (437-83-7005(17)) defines small scale, short duration operations.

C. Appendix G is designated as "non-mandatory" in the existing Asbestos Rules for Construction. However, the provisions of Appendix G are mandatory for employers engaging in construction work that is "small scale, short duration," as opposed to "full scale removal, renovation, or demolition." Therefore, the "non-mandatory" heading of Appendix G will be deleted. The introductory paragraph of Appendix G outlines the application of the appendix's requirements.

D. A provision (Rule 437-83-7023) to require the identification of asbestos-containing material prior to initiating construction work is being adopted into the Asbestos Rules for Construction. Knowledge of asbestos content of materials on the jobsite reduces the inadvertent exposure of employes to airborne asbestos fibers. This information assists the employer in planning for employe protection on the construction site.

(3) On August 24, 1987, the Notice of Proposed Amendment of Rules was mailed to those on the Department of Insurance and Finance mailing list established pursuant to OAR 436-01-000 and to those on the Department's distribution mailing list as their interest appeared.

(4) No written comments or requests for a public hearing regarding the filed Notice of Proposed Amendment of Rules have been received.

(5) It is therefore:

ORDERED that OAR Chapter 437, Occupational Safety and Health Code, Division 83, Construction, amendment of various rules and appendices, and adoption of Rules 437-83-7005(17) and 7023, as set forth in Exhibit "A," attached hereto, and hereby made a part of this order, are adopted effective September 17, 1987.

It is hereby further ordered that, pursuant to ORS 183.715, a copy of these rules be filed with the Legislative Counsel within ten days after the certified copy of the adopted rules is filed with the Secretary of State.

The Citation of Statutory Authority, Statement of Need, Principal Documents Relied Upon and Statement of Fiscal Impact, as was required by ORS 183.335(2) for filing with the Notice of Intent, are set forth again as Exhibit "B" (a duplicate filing as requested by the Secretary of State), attached hereto and hereby made a part of this order.

Dated this 17th day of September, 1987.

Department of Insurance and Finance

Theodore R. Kulongoski
Theodore R. Kulongoski, Director

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OREGON OCCUPATIONAL SAFETY AND HEALTH CODE

(Oregon Administrative Rules, Chapter 437)

Division 115

ASBESTOS

Effective November 1, 1975

(As Amended through February 15, 1987)

Workers' Compensation Department
Salem, Oregon 97310

The Oregon Workers' Compensation Department adopted these rules pursuant to ORS 654.025(2).

The Secretary of State designated OAR Chapter 437 as the "Oregon Occupational Safety and Health Code." "Chapters" of the "Oregon Occupational Safety Code for Places of Employment," under OAR Chapter 436, and "Parts" of the "Oregon Occupational Safety and Health Code" under OAR Chapter 437 will be redesignated "Divisions" of OAR Chapter 437. The redesignations will be completed as the divisions are revised and reprinted. During the changeover, the terms "Division," "Chapter" and "Part" will be synonymous.

Rules in this division of the Oregon Occupational Safety and Health Code are numbered in a uniform system developed by the Secretary of State. This system does not number the rules in sequence (001, 002, 003, etc.). Omitted numbers may be asigned to new rules at the time of their adoption.

A list of all occupational safety and health codes for the State of Oregon is available upon request.

To obtain this list or copies of these rules, address:

Workers' Compensation Department
Accident Prevention Division
Room 204, Labor and Industries Building
Salem, Oregon 97310

The rules referenced in this division are available for viewing in the Office of the Secretary of State, 121 State Capitol Building, Salem, Oregon 97310, or the Central Office, Accident Prevention Division of the Workers' Compensation Department, Room 204, Labor and Industries Building, Salem, Oregon 97310.

Oregon Administrative Rules are arranged in the following Basic Codification Structure adopted by the Secretary of State:

Chapter	Division	Rule	Section	Subsection	Paragraphs
437	40	010	(1)	(a)	(A) (i) (I) (a) (A) (i) (I)

NOTE: Date at the bottom of each page reflects the effective date of the most recent rule amendment on that page.

A vertical line in the margin indicates a rule has been amended since the last printing of this codebook. Insert pages with amended rules will also contain vertical lines to identify changed areas.

OAR 437

DIVISION 115

ASBESTOS

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OAR 437

DIVISION 115

ASBESTOS

[Ed. Note: Rules on asbestos were first adopted as **Chapter 22-017(B), Asbestos,** in Part 22 of the Oregon Occupational Safety and Health Code by WCB Admin. Order, Safety 3-1975, filed 10/6/75, **effective 11/1/75**. Prior to this time, occupational health rules were administered by the Occupational Health Section of the Health Division, Department of Human Resources. As a direct result of the passage of the Oregon Safe Employment Act (OSEAct) in 1973, these occupational health rules were adopted by the Workmen's Compensation Board (later the Workers' Compensation Department).

Amended by WCB Admin. Order, Safety 30-1976, f. 11/19/76, ef. 12/15/76.

Chapter 22-017(B), Asbestos, was redesignated and renumbered as **Division 115, Asbestos**, by WCD Admin. Order, Safety 4-1980, filed 4/17/80. **Its effective date remains 11/1/75, except that several new rules which were adopted at this time were effective 6/1/80.**

Amended by WCD Admin. Order, Safety 8-1980, f. 11/5/80, ef. 12/1/80.

Amended by WCD Admin. Order, Safety 10-1983, f. 11/21/83, ef. 12/1/83 (temporary adoption).

Amended by WCD Admin. Order, Safety 4-1984, f. 5/4/84, ef. 5/4/84 (permanent adoption).

Amended by WCD Admin. Order, Safety 8-1986; f. 9/4/86, ef. 10/1/87.

Amended by WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87. (Adoption of expanded federal standard.)

Amended by WCD Admin. Order, Safety 4-1987, f. 2/10/87, ef. 2/15/87.]

Authority of Rules

437-115-001 (1) These rules are promulgated under the Director's authority as set forth in ORS 654.025(2) and ORS 656.726(3).

Hist: WCD Admin. Order, Safety 4-1980, f. 4/17/80, ef. 6/1/80.

Effective Date

437-115-003 (1) These rules were originally adopted on 10/4/74; effective 10/25/74; as Section 22-017(B), Asbestos, of OAR Chapter 333, by the Occupational Health Section of the State Health Division.

(2) The Occupational Health Section of the State Health Division was transferred to the Workmen's Compensation Board on 7/1/75. Section 22-017(B), Asbestos, was adopted into Chapter 437, Oregon Occupational Safety and Health Code, by WCB Admin. Order, Safety 3-1975; filed 10/6/75; effective 11/1/75.

(3) Amended 11/19/76 by WCB Admin. Order, Safety 30-1976; filed 11/19/76; effective 12/15/76.

(4) Redesignated as Division 115, Asbestos, and amended 4/17/80 by WCD Admin. Order, Safety 4-1980; filed 4/17/80; effective 6/1/80.

Hist: WCD Admin. Order, Safety 4-1980, f. 4/17/80, ef. 6/1/80.

Scope and Application

437-115-004 (1) OAR 437-115-004, 005(1)(a) & (b), and 010 through 055, apply to all occupational exposures to non-asbestiform tremolite, anthophyllite and actinolite, in all industries covered by the Oregon Safe Employment Act, **except** as provided in OAR 437-115-004(2).

(2) OAR 437-115-004, 005(2)(a) through (j), and 110 through 170, apply to all occupational exposures to asbestos, tremolite, anthophyllite, and actinolite, in all industries covered by the Oregon Safe Employment Act, **except** as provided in OAR 437-115-004(3).

(3) This division does **not** apply to construction work as defined in OAR 437-83-004(8) in OAR 437, Division 83, Construction. (Exposure to asbestos, tremolite, anthophyllite, and actinolite in construction work is covered by Division 83, Construction.)

Hist: WCD Admin. Order, Safety 4-1980, f. 4/17/;80, ef. 6/1/80.
WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Definitions

437-115-005 (1) The following definitions apply in OAR 437-115-010 through 055:

(a) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(b) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(2) The following definitions apply in OAR 437-115-110 through 170:

(a) **Action level:** An airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals, of 0.1 fiber per cubic centimeter (f/cc) of air calculated as an eight (8) hour time-weighted average.

(b) **Asbestos:** Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that have been chemically treated and/or altered.

(c) **Administrator:** The administrator of the Accident Prevention Division, or appointed representative.

(d) **Authorized person:** Any person authorized by the employer and required by work duties to be present in regulated areas.

(e) **Director:** The Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

(f) **Employe exposure:** That exposure to airborne asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals that would occur if the employe were not using respiratory protective equipment.

(g) **Fiber:** A particulate form of asbestos, tremolite, anthophyllite, or actinolite, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

(h) **High-efficiency particulate air (HEPA) filter:** A filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter mono-disperse particles.

(i) **Regulated area:** An area established by the employer to demarcate areas where airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals exceed, or can reasonably be expected to exceed, the permissible exposure limit.

(j) **Tremolite, anthophyllite, or actinolite:** The non-asbestos form of these minerals, and any of these minerals that have been chemically treated and/or altered.

(Formerly 22-017(B)(6)(1) through (3))

Hist: WCD Admin. Order, Safety 4-1980, f. 4/17/;80, ef. 6/1/80.
WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Permissible Exposure Limits

437-115-010 Permissible exposure to airborne concentrations of asbestos fibers.

(1) Code effective July 1, 1974. The 8-hour time-weighted average (TWA) airborne concentrations of asbestos fibers to which any employe may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in OAR 437-115-030.

(2) Code effective July 1, 1976. The 8-hour time-weighted average (TWA) airborne concentrations of asbestos fibers to which any employe may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in OAR 437-115-030.

(3) Ceiling concentration. No employe shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in OAR 437-115-030.

(Formerly 22-017(B)(b)(1) thru (3).)

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Action Level for Asbestos

437-115-011 (1) **Scope.** This rule is issued pursuant to ORS 183.335(5) and applies to all workplaces where employes may be exposed to asbestos in all industries covered by ORS Chapter 654, including general industry, construction and maritime. Except to the extent modified by this rule, all provisions of Division 115, Asbestos, remain in effect.

(2) **Permissible Level of Exposure--Action Level.** The 8-hour time-weighted average airborne concentration of asbestos fibers to which any employe may be exposed shall not exceed one-half (0.5) fiber, longer than 5 micrometers, per cubic centimeter of air (f/cc), as determined by the method prescribed in OAR 437-115-030.

(3) **Methods of Compliance.** Notwithstanding any other requirements of Division 115, Asbestos, compliance with the reduced exposure limit of 0.5 f/cc shall be achieved by any feasible combination of engineering controls, work practices, and personal protective equipment and devices.

(4) **Employe Information and Training.**

(a) The employer shall institute a training program for all employes exposed to airborne concentrations of asbestos in excess of 0.5 f/cc, without regard to the use of respirators and shall assure their participation in the program during the effective period of this rule.

(b) The employer shall assure that each such employe is informed of the following:

(A) The health effects associated with asbestos exposure;

(B) The relationship between asbestos and smoking in producing lung cancer;

(C) The nature of operations which could result in exposure to asbestos and necessary protective steps to minimize exposure including, as applicable, engineering controls, work practices, respirators, housekeeping and protective clothing;

(D) The purpose, proper use, fitting instructions and limitations of respirators permitted by Division 115, Asbestos; and

(E) A review of all the provisions contained in Division 115, Asbestos.

(5) **Respiratory Protection.** Notwithstanding any other requirement of Division 115, Asbestos, where respirators are used to achieve the permissible exposure limit of 0.5 f/cc, they shall be selected according to Table 1-A.

(6) **Warnings Signs.** In addition to the requirements of Rule 437-115-040(1), legible signs warning of the health hazards of asbestos shall be provided and displayed at each location where airborne concentrations of asbestos fibers may exceed 0.5 f/cc.

TABLE 1-A

RESPIRATORY PROTECTION FOR AIRBORNE CONCENTRATIONS OF ASBESTOS

Airborne Concentration of Asbestos (TWA)	Required Respirator[1]
Not in excess of 5 f/cc (10 X PEL)	Reusable or single use air-purifying respirator
Not in excess of 50 f/cc (100 X PEL)	Full facepiece air purifying respirator, or a powered air-purifying respirator
Greater than 50 f/cc	A type "C" continuous flow or pressure demand, supplied air respirator

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[1] Respirators specified for high concentrations may be used at lower concentrations of asbestos.

Hist: WCD Admin. Order, Safety 10-1983, f. 11/21/83, ef. 12/1/83.
WCD Admin. Order, Safety 4-1984, f. 5/4/84, ef. 5/4/84.

Methods of Compliance - Engineering Methods

437-115-015 (1) Engineering controls. Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in OAR 437-115-010.

(2) **Local exhaust ventilation.**

(a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2-1971, which is incorporated by reference herein, or the ACGIH Industrial Ventilation Manual.

(b) Contact the regional offices of the Accident Prevention Division, Workers' Compensation Department, for information or access to ANSI Z9.2-1971.

(3) **Particular tools.** All hand-operated and power-operated tools, such as, but not limited to, saws, scorers, abrasive wheels and drills, which may produce or release asbestos fibers under normal or frequent working conditions, or produce or release asbestos fibers in excess of the exposure limits prescribed in OAR 437-115-010, shall be provided with local exhaust ventilation systems in accordance with section (2) of this rule.

(Formerly 22-017(B)(c)(1)(i) thru (iii).)

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Methods of Compliance - Work Practices

437-115-020 (1) **Wet methods.** Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state, and such wetting shall be sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in OAR 437-115-010, unless the usefulness of the product would be diminished thereby.

(2) **Particular products and operations.** No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated, and these procedures shall prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in OAR 437-115-010.

(3) **Spraying, demolition, or removal.** Employes engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with OAR 437-115-025(2)(c) and with special clothing in accordance with OAR 437-115-025(3).

(Formerly 22-017(B)(c)(2)(i) thru (iii).)

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Personal Protective Equipment

437-115-025 (1) Compliance with the exposure limits prescribed by OAR 437-115-010 may not be achieved by the use of respirators or shift rotation of employes, **except**:

(a) During the time period necessary to install the engineering controls and to institute the work practices required by OAR 437-115-015;

(b) In work situations in which the methods prescribed in OAR 437-115-015 of this division are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by OAR 437-115-010; or

(c) **In emergencies**;

(d) Where both respirators and personnel rotation are allowed by subsection (a), (b), or (c) of OAR 437-115-025(1), and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by section (1) of OAR 437-115-025, it shall be selected from among those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subsections (a), (b), (c), and (d) of OAR 437-115-025(2).

Note: NIOSH has approved for a limited time the use of certain respiratory protective equipment which in the past was approved by the U.S. Bureau of Mines. The length of the approval is dependent upon the type of respiratory protective equipment involved. Questions about the use of such equipment should be referred to the Accident Prevention Division.

(a) **Air-purifying respirators.** A reusable or single-use air-purifying respirator, or a respirator described in subsection (b) or (c) of OAR 437-115-025(2), shall be used wherever asbestos releasing materials are handled, or to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in OAR 437-115-010 , when the ceiling or the 8-hour time-weighted average (TWA) airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(b) **Powered air-purifying respirators.** A full facepiece powered air-purifying respirator, or a powered air-purifying respirator, or a respirator described in subsection (c) of OAR 437-115-025(2), shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in OAR 437-115-010, when the ceiling or the 8-hour time-weighted average (TWA) concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(c) **Type "C" supplied-air respirators, continuous flow or pressure-demand class.** A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used during spraying, demolition, or the removal of asbestos containing materials, as described in OAR 437-115-020(3), or reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in OAR 437-115-010(b), when the ceiling or the 8-hour time-weighted average (TWA) airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(d) **Establishment of a respirator program.**

(A) The employer shall establish a respirator program in accordance with the requirements of the American National Standard Practices for Respiratory Protection, ANSI Z88.2-1969, which is incorporated by reference herein. The respirator program shall be in accordance with OAR 437, Division 129, Protective Equipment, Apparel and Respirators.

(B) Contact the regional offices of the Accident Prevention Division, Workers' Compensation Department, for information or access to ANSI Z88.2-1969.

(C) No employe shall be assigned to tasks requiring the use of respirators if, based upon his/her most recent examination, an examining physician determines that the employe will be unable to function normally wearing a respirator, or that the safety or health of the employe or other employes will be impaired by his/her use of a respirator. Such employe shall be rotated to another job or given the opportunity to transfer to a different position whose duties he/she is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he/she had just prior to such transfer, if such a different position is available.

(3) **Special clothing:** The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employe exposed to airborne concentrations of asbestos fibers, which are reasonably expected to exceed the ceiling level prescribed in OAR 437-115-010.

(4) **Change rooms:**

(a) At any fixed place of employment which is reasonably expected to be exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in OAR 437-115-010, the employer shall provide change rooms for employes working regularly at the place of employment.

(b) Clothes lockers. The employer shall provide two separate lockers or containers for each employe, so separated or isolated as to prevent contaimination of the employe's street clothes from his/her work clothes.

(c) Laundering:

(A) Laundering of asbestos contaminated clothing shall be done so as to prevent or minimize the release of airborne asbestos fibers, and in no case shall the release of asbestos fibers be in excess of the exposure limits prescribed in OAR 437-115-010.

(B) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (A) of this subsection to effectively prevent or minimize the release of airborne asbestos fibers, and to prevent the release of asbestos fibers in excess of the exposure limits prescribed in OAR 437-115-010.

(C) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with OAR 437-115-040.

(Formerly 22-017(B)(d)(1) thru (4))

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Method of Measurement

437-115-030 (1) All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400-450 x (magnification) (4 millimeter objective) with phase contrast illumination. (Formerly 22-017(B)(e))

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Monitoring

437-115-035 (1) **Initial determinations.** Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employe's exposure to asbestos fibers is below the limits prescribed in OAR 437-115-010. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with OAR 437-115-015.

(2) **Personal monitoring.**

(a) Samples shall be collected from within the breathing zone of the employes, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average (TWA) airborne concentrations and of the ceiling concentrations of asbestos fibers.

(b) Sampling frequency and patterns. After the initial determinations required by section (1) of this rule, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employes. In no case shall the sampling be done at intervals greater than 6 months for employes whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by OAR 437-115-010.

(3) **Environmental monitoring.**

(a) Samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employes. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average (TWA) airborne concentrations and of the ceiling concentrations of asbestos fibers.

(b) Sampling frequency and patterns. After the initial determinations required by section (1) of this rule, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employes. In no case shall sampling be at intervals greater than 6 months for employes whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in OAR 437-115-010.

(4) **Employe observation of monitoring.** Affected employes, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this rule and shall have access to the records thereof.

(Formerly 22-017(B)(f)(1) thru (4))

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Caution Signs and Labels

437-115-040 (1) **Caution signs:**

(a) **Posting.** Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers are reasonably expected to be released, or where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in OAR 437-115-010. Signs shall be posted at such a distance from such a location so that an employe may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing airborne asbestos fibers.

(b) **Sign specifications.** The warning signs required by subsection (a) of OAR 437-115-040(1) shall conform to the requirements of 20" x 14" vertical format signs specified in OAR 437, Division 113, Warning Signs, Tags and Labels, and to this subsection. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subsection.

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Legend	Notation
Asbestos	1" Sans Serif, Gothic or Block
Dust Hazard	3/4" Sans Serif, Gothic or Block
Avoid Breathing Dust	1/4" Gothic
Wear Assigned Protective Equipment	1/4" Gothic
Do Not Remain In Area Unless Your Work Requires It	1/4" Gothic
Breathing Asbestos Dust May Be Hazardous To Your Health	14 point Gothic

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) **Caution labels.**

(a) **Labeling.** Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonable forseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers will be released.

This exception does **not** apply to OAR 437-0115-040(2)(b).

(b) **Labeling pipe insulation.** Pipes or piping systems which use asbestos as a pipe insulation material shall be labelled in accordance with OAR 437, Division 153, Pipe Labelling, OAR 437-153-010(2).

(c) **Label specifications.** The caution labels required by subsection (a) of OAR 437-115-040(2) shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

DANGER
Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard

(Formerly 22-017(B)(g)(1) and (2)

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.
WCD Admin. Order, Safety 8-1986, f. 9//4/86, ef. 10/1/87.

Housekeeping

437-115-045 (1) **Cleaning.** All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers.

(2) **Waste disposal.** Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(Formerly 22-017(B)(h)(1) and (2))

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Recordkeeping

437-115-050 (1) **Exposure records.** Every employer shall maintain records of any personal or environmental monitoring required by this division. Records shall be maintained for a period of at least 20 years and shall be made available upon request to the Administrator of the Accident Prevention Division, or authorized representative.

(2) **Employe Access.** Employe exposure records required by this rule shall be provided upon request to employes, designated representatives, and the Administrator in accordance with OAR 437, Division 200, Employe Access to Exposure and Medical Records, OAR 437-200-001 through 025 and 437-200-035 through 045.

(3) **Employe notification.** Any employe found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in OAR 437-115-010 shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employe shall also be timely notified of the corrective action being taken.

(Formerly 22-017(B)(i)(1) thru (3))

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.
WCB Admin. Order, Safety 30-1976, f. 11/19/76, ef. 12/15/76.
WCD Admin. Order, Safety 8-1980, f. 11/5/80, ef. 12/1/80.

Medical Examinations

437-115-055 (1) **General.** The employer shall provide or make available at the employer's cost, medical examinations relative to exposure to asbestos required by this rule.

(a) Employes who, as a regular or expected part of their employment, are exposed to airborne asbestos fibers shall be given exams as specified in OAR 437-115-055.

(b) Employes whose contact with airborne asbestos fibers is unpredictable, sporadic and infrequent, with exposure to airborne asbestos fibers concentration not exceeding 0.1 fibers/cc as an 8-hour time-weighted average or 0.5

fibers/cc on a 15-minute peak basis, are exempted from medical exam requirements.

(2) **Preplacement.** The employer shall provide or make available to each employe, within 30 calendar days following his/her first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV 1.0).

(3) **Annual examinations.** On or before July 1, 1974, and at least annually there after, every employer shall provide, or make available comprehensive medical examinations to each employe engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV 1.0).

(4) **Termination of employment.** The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employe engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV 1.0).

(5) If an employe has been given a pre-employment exam meeting requirements of OAR 437-115-055(2) and he/she terminates in the period at least six months before his/her first annual exam or within the six months following his/her last annual exam, it is not necessary to provide an additional examination.

(6) **Recent examinations.** No medical examination is required of any employe, if adequate records show that the employe has been examined in accordance with this rule within the past 1-year period.

(7) **Medical records:**

(a) **Maintenance.** Employers of employes examined pursuant to this rule shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(b) **Access.** The records of the medical examinations required by this rule shall be provided upon request to employes, designated representatives, and the Administrator in accordance with OAR 437, Division 200, Employe Access to Exposure and Medical Records, OAR 437-200-001 through 025 and 437-200-035 through 045. Any physician who conducts a medical examination required by this rule shall furnish to the employer of the examined employe all the information specifically required by this rule, and any other medical information related to occupational exposure to asbestos fibers.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.
WCD Admin Order Safety 4-1980, f. 4/17/80, ef. 6/1/80.
WCD Admin Order Safety 8-1980, f. 11/5/80, ef. 12/1/80.

Dates

437-115-103 (1) **Effective dates.** These rules shall become effective February 15, 1987. The requirements of the asbestos code, OAR 437, Division 115, Asbestos, as amended by WCD Admin. Order, Safety 4-1984 (effective May 4, 1984), remain in effect until compliance is achieved with the parallel provisions of these rules, but no later than the start-up dates prescribed in OAR 437-115-103(2) below.

(2) **Start-up dates.** All obligations of this code commence on the effective date except as follows:

(a) **Exposure monitoring.** Initial monitoring required by OAR 437-115-112(2) shall be completed as soon as possible but no later than May 15, 1987.

(b) **Regulated areas.** Regulated areas required to be established by OAR 437-115-113 as a result of initial monitoring shall be set up as soon as possible after the results of that monitoring is known and not later than June 15, 1987.

(c) **Respiratory protection.** Respiratory protection required by OAR 437-115-125 shall be provided as soon as possible but no later than the following schedule:

(A) Employes whose 8-hour TWA exposure exceeds 2 fibers/ cc - March 15, 1987.

(B) Employes whose 8-hour TWA exposure exceeds the PEL but is less than 2 fibers/cc - June 15, 1987.

(C) Powered air-purifying respirators provided under OAR 437-115-025(2)(b) - August 15, 1987.

(d) **Hygiene and lunchroom facilities.** Construction plans for change-rooms, showers, lavatories, and lunchroom facilities shall be completed no later than July 20, 1987; and these facilities shall be constructed and in use no later than July 20, 1988. However, if as part of the compliance plan it is predicted by an independent engineering firm that engineering controls and work practices will reduce exposures below the permissible exposure limit by July 20,1988, for affected employes, then such facilities need not be completed until 1 year after the engineering controls are completed, if such controls have not in fact succeeded in reducing exposure to below the permissible exposure limit.

(e) **Employe information and training.** Employe information and training required by OAR 437-115-128(5) shall be provided as soon as possible but no later than May 15, 1987.

(f) **Medical surveillance.** Medical examinations required by OAR 437-115-155 shall be provided as soon as possible but no later than June 15, 1987.

(g) **Compliance program.** Written compliance programs required by OAR 437-115-115(2) as a result of initial monitoring shall be completed and available for inspection and copying as soon as possible but no later than July 20, 1987.

(h) **Methods of compliance.** The engineering and work practice controls as required by OAR 437-115-115 shall be implemented as soon as possible but no later than July 20, 1988.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.
WCD Admin. Order, Safety 4-1987, f. 2/10/87, ef. 2/15/87.

Permissible Exposure Limit (PEL)

437-115-110 The employer shall ensure that no employe is exposed to an airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of 0.2 fiber per cubic centimeter of air as an eight (8)-hour time-weighted average (TWA) as determined by the method prescribed in Appendix A of this division, or by an equivalent method.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Exposure Monitoring

437-115-112 (1) General.

(a) Determinations of employe exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA of each employe.

(b) Representative 8-hour TWA employe exposures shall be determined on the basis of one or more samples representing full-shift exposures for each shift for each employe in each job classification in each work area.

(2) **Initial monitoring.**

(a) Each employer who has a workplace or work operation covered by this division, except as provided for in OAR 437-115-112(2)(b) and OAR 437-115-112(2)(c) shall perform initial monitoring of employes who are, or may reasonably be expected to be exposed to airborne concentrations at or above the action level.

(b) Where the employer has monitored after December 20, 1985, and the monitoring satisfies all other requirements of this division, the employer may rely on such earlier monitoring results to satisfy the requirements of OAR 437-115-112(2)(a).

(c) Where the employer has relied upon objective data that demonstrates that asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals is not capable of being released in airborne concentrations at or above the action level under the expected conditions of processing, use, or handling, then no initial monitoring is required.

(3) **Monitoring frequency (periodic monitoring) and patterns.** After the initial determinations required by OAR 437-115-112(2)(a), samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employes. In no case shall sampling be at intervals greater than six months for employes whose exposures may reasonably be foreseen to exceed the action level.

(4) **Changes in monitoring frequency.** If either the initial or the periodic monitoring required by OAR 437-115-112(2) and (3) statistically indicates that employe exposures are below the action level, the employer may discontinue the monitoring for those employes whose exposures are represented by such monitoring.

(5) **Additional monitoring.** Notwithstanding the provisions of OAR 437-115-112(2)(b) and OAR 437-115-112(4) the employer shall institute the exposure monitoring required under OAR 437-115-112(2)(a) and OAR 437-115-112(3) whenever there has been a change in the production, process, control equipment, personnel or work practices that may result in new or additional exposures above the action level or when the employer has any reason to suspect that a change may result in new or additional exposures above the action level.

(6) **Method of monitoring.**

(a) All samples taken to satisfy the monitoring requirements of OAR 437-115-112 shall be personal samples collected following the procedures specified in Appendix A.

(b) All samples taken to satisfy the monitoring requirements of OAR 437-115-112 shall be evaluated using the OSHA Reference Method (ORM) specified in Appendix A of this division, or an equivalent counting method.

(c) If an equivalent method to the ORM is used, the employer shall ensure that the method meets the following criteria:

(A) Replicate exposure data used to establish equivalency are collected in side-by-side field and laboratory comparisons; and

(B) The comparison indicates that 90% of the samples collected in the range 0.5 to 2.0 times the permissible limit have an accuracy range of plus or minus 25 percent of the ORM results with a 95% confidence level as demonstrated by a statistically valid protocol; and

(C) The equivalent method is documented and the results of the comparison testing are maintained.

(d) To satisfy the monitoring requirements of OAR 437-115-112 employers must use the results of monitoring analysis performed by laboratories which have instituted quality assurance programs that include the elements as prescribed in Appendix A.

(7) **Employe notification of monitoring results.**

(a) The employer shall, within 15 working days after the receipt of the results of any monitoring performed under the standard, notify the affected employes of these results in writing either individually or by posting of results in an appropriate location that is accessible to affected employes.

(b) The written notification required by OAR 437-115-112(7)(a), shall contain the corrective action being taken by the employer to reduce employe exposure to or below the PEL, wherever monitoring results indicated that the PEL had been exceeded.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Regulated Areas

437-115-113 (1) **Establishment.** The employer shall establish regulated areas wherever airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals are in excess of the permissible exposure limit prescribed in OAR 437-115-110.

(2) **Demarcation.** Regulated areas shall be demarcated from the rest of the workplace in any manner that minimizes the number of persons who will be exposed to asbestos, tremolite, anthophyllite, or actinolite.

(3) **Access.** Access to regulated areas shall be limited to authorized persons or to persons authorized by the Administrator.

(4) **Provision of respirators.** Each person entering a regulated area shall be supplied with and required to use a respirator, selected in accordance with OAR 437-115-125(2).

(5) **Prohibited activities.** The employer shall ensure that employes do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated areas.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Methods of Compliance

437-115-115 (1) **Engineering controls and work practices.**

(a) The employer shall institute engineering controls and work practices to reduce and maintain employe exposure to or below the exposure limit prescribed in OAR 437-115-110, except to the extent that such controls are not feasible.

(b) Wherever the feasible engineering controls and work practices that can be instituted are not sufficient to reduce employe exposure to or below the permissible exposure limit prescribed in OAR 437-115-110, the employer shall use them to reduce employe exposure to the lowest levels achievable by these controls and shall supplement them by the use of respiratory protection that complies with the requirements of OAR 437-115-125.

(c) For the following operations, wherever feasible engineering controls and work practices that can be instituted are not sufficient to reduce the employe exposure to or below the permissible exposure limit prescribed in OAR 437-115-110 the employer shall use them to reduce employe exposure to or below 0.5 fiber per cubic centimeter of air (as an eight-hour time-weighted average) and shall supplement them by the use of any combination of respiratory protection that complies with the requirements of OAR 437-115-125, work practices and feasible engineering controls that will reduce employe exposure to or below the permissible exposure limit prescribed in OAR 437-115-110: coupling cutoff in primary asbestos cement pipe manufacturing; sanding in primary and secondary asbestos cement sheet manufacturing; grinding in primary and secondary friction product manufacturing; carding and spinning in dry textile processes; and grinding and sanding in primary plastics manufacturing.

(d) **Local exhaust ventilation.** Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with good practices such as those found in the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2-1979.

(e) **Particular tools.** All hand-operated and power-operated tools which would produce or release fibers of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals so as to expose employes to levels in excess of the exposure limit prescribed in OAR 437-115-110, such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems which comply with OAR 437-115-115(1)(c) of this section.

(f) **Wet methods.** Insofar as practicable, asbestos, tremolite, anthophyllite, or actinolite shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers so as to expose employes to levels in excess of the exposure limit prescribed in OAR 437-115-110, unless the usefulness of the product would be diminished thereby.

(g) Materials containing asbestos, tremolite, anthophyllite, or actinolite shall **not** be applied by spray methods.

(h) **Particular products and operations.** No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos, tremolite, anthophyllite, or actinolite shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne fibers of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals so as to expose employes to levels in excess of the limit prescribed in OAR 437-115-110.

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(i) **Compressed air**. Compressed air shall not be used to remove asbestos, tremolite, anthophyllite, or actinolite or materials containing asbestos, tremolite, anthophyllite, or actinolite, unless the compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air.

(2) **Compliance program.**

(a) Where the PEL is exceeded, the employer shall establish and implement a written program to reduce employe exposure to or below the limit by means of engineering and work practice controls as required by OAR 437-115-115(1) and by the use of respiratory protection where required or permitted under this section.

(b) Such programs shall be reviewed and updated as necesary to reflect significant changes in the status of the employer's compliance program.

(c) Written programs shall be submitted upon request for examination and copying to the Administrator, affected employes and designated employe representatives.

(d) The employer shall not use employe rotation as a means of compliance with the PEL.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Respiratory Protection

437-115-125 (1) **General.** The employer shall provide respirators, and ensure that they are used, where required by this division. Respirators shall be used in the following circumstances:

(a) During the interval necessary to install or implement feasible engineering and work practice controls;

(b) In work operations, such as maintenance and repair activities, or other activities for which engineering and work practice controls are not feasible;

(c) In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the exposure limit; and

(d) In emergencies.

(2) **Respirator selection.**

(a) Where respirators are required under this division, the employer shall select and provide, at no cost to the employe, the appropriate respirator as specified in Table 1-B, The employer shall select respirators from among those jointly approved as being acceptable for protection by the Mine Safety and

Health Administration (MSHA) and by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11.

(b) The employer shall provide a powered, air-purifying respirator in lieu of any negative pressure respirator specified in Table 1-B whenever:

(A) An employe chooses to use this type of respirator; and

(B) This respirator will provide adequate protection to the employe.

TABLE 1-B

RESPIRATORY PROTECTION FOR ASBESTOS, TREMOLITE, ANTHOPHYLLITE, AND ACTINOLITE FIBERS

Airborne Concentration of Asbestos, Tremolite, Anthophyllite, Actinolite, or a Combination of These Minerals	**Required Respirator**
Not in excess of 2 f/cc (10 X PEL)	1. Half-mask air-purifying respirator equipped with high-efficiency filters.
Not in excess of 10 f/cc (50 X PEL)	1. Full facepiece air-purifying respirator equipped with high-efficiency filters.
Not in excess of 20 f/cc (100 X PEL)	1. Any powered air-purifying respirator equipped with high-efficiency filters. 2. Any supplied-air respirator operated in continuous flow mode.
Not in excess of 200 f/cc (1000 X PEL)	1. Full facepiece supplied-air respirator operated in pressure demand mode.
Greater than 200 f/cc (1,000 X PEL) or unknown concentration	1. Full facepiece supplied-air respirator operated in pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus.

Note: a. Respirators assigned for higher environmental concentrations may be used at lower concentrations.

b. A high-efficiency filter means a filter that is at least 99.97 percent efficient against mono-dispersed particles of 0.3 micrometers or larger.

(3) Respirator program.

(a) Where respiratory protection is required, the employer shall institute a respirator program in accordance with OAR 437, Division 129, Protective Equipment, Apparel and Respirators, OAR 437-129-025, -035, -040 and -045.

(b) The employer shall permit each employe who uses a filter respirator to change the filter elements whenever an increase in breathing resistance is detected and shall maintain an adequate supply of filter elements for this purpose.

(c) Employes who wear respirators shall be permitted to leave the regulated area to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

(d) No employe shall be assigned to tasks requiring the use of respirators if, based upon his or her most recent examination, an examining physician determines that the employe will be unable to function normally wearing a respirator, or that the safety or health of the employe or other employes will be impaired by the use of a respirator. Such employe shall be assigned to another job or given the opportunity to transfer to a different position whose duties he or she is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay the employe had just prior to such transfer, if such a different position is available.

(4) Respirator fit testing.

(a) The employer shall ensure that the respirator issued to the employe exhibits the least possible facepiece leakage and that the respirator is fitted properly.

(b) For each employe wearing negative pressure respirators, employers shall perform either quantitative or qualitative face fit tests at the time of initial fitting and at least every six months thereafter. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, and shall be conducted in accordance with Appendix C. The tests shall be used to select facepieces that provide the required protection as prescribed in Table 1-B.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Protective Work Clothing and Equipment

437-115-127 (1) **Provision and use.** If an employe is exposed to asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals above the PEL, or where the possibility of eye irritation exists, the employer shall provide at no cost to the employe and ensure that the employe uses appropriate protective work clothing and equipment such as, but not limited to:

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(a) Coveralls or similar full-body work clothing;

(b) Gloves, head coverings, and foot coverings; and

(c) Face shields, vented goggles, or other appropriate protective equipment which complies with OAR 437, Division 50, Personal Protective Equipment, OAR 437-50-125.

(2) **Removal and storage.**

(a) The employer shall ensure that employes remove work clothing contaminated with asbestos, tremolite, anthophyllite, or actinolite only in change rooms provided in accordance with OAR 437-115-128(1).

(b) The employer shall ensure that no employe takes contaminated work clothing out of the change room, except those employes authorized to do so for the purpose of laundering, maintenance, or disposal.

(c) Contaminated work clothing shall be placed and stored in closed containers which prevent dispersion of the asbestos, tremolite, anthophyllite, and actinolite outside the container.

(d) Containers of contaminated protective devices or work clothing which are to be taken out of change rooms or the workplace for cleaning, maintenance or disposal, shall bear labels in accordance with OAR 437- 115-140(2).

(3) **Cleaning and replacement.**

(a) The employer shall clean, launder, repair, or replace protective clothing and equipment required by Division 115 to maintain their effectiveness. The employer shall provide clean protective clothing and equipment at least weekly to each affected employe.

(b) The employer shall prohibit the removal of asbestos, tremolite, anthophyllite, and actinolite from protective clothing and equipment by blowing or shaking.

(c) Laundering of contaminated clothing shall be done so as to prevent the release of airborne fibers of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the permissible exposure limit prescribed in OAR 437-115-110.

(d) Any employer who gives contaminated clothing to another person for laundering shall inform such person of the requirement in OAR 437-115-127(3)(c) to effectively prevent the release of airborne fibers of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the permissible exposure limit.

(e) The employer shall inform any person who launders or cleans protective clothing or equipment contaminated with asbestos, tremolite, anthophyllite, or actinolite, of the potentially harmful effects of exposure to asbestos, tremolite, anthophyllite, or actinolite.

(f) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with OAR 437-115-140.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Hygiene Facilities and Practices

437-115-128 (1) Change rooms.

(a) The employer shall provide clean change rooms for employes who work in areas where their airborne exposure to asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals is above the permissible exposure limit.

(b) The employer shall ensure that change rooms are in accordance with OAR 437, Division 136, General Occupational Health Regulations, OAR 437-136-050, and are equipped with two separate lockers or storage facilities, so separated as to prevent contamination of the employe's street clothes from his protective work clothing and equipment.

(2) **Showers.**

(a) The employer shall ensure that employes who work in areas where their airborne exposure is above the permissible exposure limit shower at the end of the work shift.

(b) The employer shall provide shower facilities which comply with OAR 437-112-055.

(c) The employer shall ensure that employes who are required to shower pursuant to OAR 437-115-128(2)(a) do not leave the workplace wearing any clothing or equipment worn during the work shift.

(3) **Lunchrooms.**

(a) The employer shall provide lunchroom facilities for employes who work in areas where their airborne exposure is above the permissible exposure limit.

(b) The employer shall ensure that lunchroom facilities have a positive pressure, filtered air supply, and are readily accessible to employes.

(c) The employer shall ensure that employes who work in areas where their airborne exposure is above the permissible exposure limit wash their hands and faces prior to eating, drinking or smoking.

(d) The employer shall ensure that employes do not enter lunchroom facilities with protective work clothing or equipment unless surface asbestos, tremolite, anthophyllite, and actinolite fibers have been removed from the clothing or equipment by vaccuming or other method that removes dust without causing the asbestos, tremolite, anthophyllite, or actinolite to become airborne.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Communication of Hazards to Employes

437-115-140 (1) **Warning signs.**

(a) **Posting.** Warning signs shall be provided and displayed at each regulated area. In addition, warning signs shall be posted at all approaches to regulated areas so that an employe may read the signs and take necessary protective steps before entering the area.

(b) **Labeling pipe insulation.** Pipes or piping systems which use asbestos as a pipe insulation material shall be labelled in accordance with OAR 437, Division 153, Pipe Labelling, OAR 437-153-010(2).

(c) **Sign specifications.** The warning signs required by OAR 437-115-140(1)(a) shall bear the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

(d) Where minerals in the regulated area are only tremolite, anthophyllite or actinolite, the employer may replace the term "asbestos" with the appropriate mineral name.

(2) **Warning labels.**

(a) **Labeling.** Warning labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos, tremolite, anthophyllite, or actinolite fibers, or to their containers.

(b) **Label specifications.** The labels shall comply with the requirements of OAR 437, Division 155, Hazard Communication, OAR 437-155-020 and shall include the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(c) Where minerals to be labeled are only tremolite, anthophyllite, or actinolite, the employer may replace the term "asbestos" with the appropriate mineral name.

(3) **Material Safety Data Sheets.** Employers who are manufacturers or importers of asbestos, tremolite, anthophyllite, or actinolite or asbestos, tremolite, anthophyllite, or actinolite products shall comply with the requirements regarding development of material safety data sheets as specified in OAR 437-155-025 of OAR 437, Division 155, Hazard Communication, **except** as provided by OAR 437- 115-140(4).

(4) **The provisions for labels required by OAR 437-115-140(2) or for material safety data sheets required by OAR 437-115-140(3) do not apply where:**

(a) Asbestos, tremolite, anthophyllite, or actinolite fibers have been modified by a bonding agent, coating, binder, or other material provided that the manufacturer can demonstrate that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of fibers of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the action level will be released; or

(b) Asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals is present in a product in concentrations less than 0.1%.

(5) **Employe information and training.**

(a) The employer shall institute a training program for all employes who are exposed to airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals at or above the action level and shall ensure their participation in the program.

(b) Training shall be provided prior to or at the time of initial assignment and at least annually thereafter.

(c) The training program shall be conducted in a manner which the employe is able to understand. The employer shall ensure that each employe is informed of the following:

(A) The health effects associated with asbestos, tremolite, anthophyllite, or actinolite exposure;

(B) The relationship between smoking and exposure to asbestos, tremolite, anthophyllite, and actinolite in producing lung cancer;

(C) The quantity, location, manner of use, release, and storage of asbestos, tremolite, anthophyllite, or actinolite, and the specific nature of operations which could result in exposure to asbestos, tremolite, anthophyllite, or actinolite;

(D) The engineering controls and work practices associated with the employe's job assignment;

(E) The specific procedures implemented to protect employes from exposure to asbestos, tremolite, anthophyllite, or actinolite, such as appropriate work practices, emergency and clean-up procedures, and personal protective equipment to be used;

(F) The purpose, proper use, and limitations of respirators and protective clothing;

(G) The purpose and a description of the medical surveillance program required by OAR 437-115-155;

(H) A review of this division, OAR 437-115, Asbestos, including appendices.

(d) Access to information and training materials.

(A) The employer shall make a copy of this division and its appendices readily available without cost to all affected employes.

(B) The employer shall provide, upon request, all materials relating to the employe information and training program to the Administrator.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Housekeeping

437-115-145 (1) All surfaces shall be maintained as free as practicable of accumulations of dusts and waste containing asbestos, tremolite, anthophyllite, or actinolite.

(2) All spills and sudden releases of material containing asbestos, tremolite, anthophyllite, or actinolite shall be cleaned up as soon as possible.

(3) Surfaces contaminated with asbestos, tremolite, anthophyllite, or actinolite may not be cleaned by the use of compressed air.

(4) Vacuuming. HEPA-filtered vacuuming equipment shall be used for vacuuming. The equipment shall be used and emptied in a manner which minimizes the reentry of asbestos, tremolite, anthophyllite, or actinolite into the workplace.

(5) Shoveling, dry sweeping and dry clean-up of asbestos, tremolite, anthophyllite, or actinolite may be used only where vacuuming and/or wet cleaning are not feasible.

(6) Waste disposal. Waste, scrap, debris, bags, containers, equipment, and clothing contaminated with asbestos, tremolite, anthophyllite, or actinolite consigned for disposal, shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Medical Surveillance

437-115-155 (1) General.

(a) **Employes covered.** The employer shall institute a medical surveillance program for all employes who are or will be exposed to airborne concentrations of fibers of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals at or above the action level.

(b) **Examination by a physician.**

(A) The employer shall ensure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and shall be provided without cost to the employe and at a reasonable time and place.

(B) Persons other than licensed physicians, who administer the pulmonary function testing required by this division, shall complete a training course in spirometry sponsored by an appropriate academic or professional institution.

(2) **Preplacement examinations.**

(a) Before an employe is assigned to an occupation exposed to airborne concentrations of asbestos, tremolite, anthophyllite, or actinolite fibers, a preplacement medical examination shall be provided or made available by the employer.

(b) Such examination shall include, as a minimum, a medical and work history; a complete physical examination of all systems with emphasis on the respiratory system, the cardiovascular system and digestive tract; completion of the respiratory disease standardized questionnaire in Appendix D, a chest roentgenogram (posterior-anterior 14x17 inches); pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV_1); and any additional tests deemed appropriate by the examining physician. Interpretation and classification of chest roentgenograms shall be conducted in accordance with Appendix E.

(3) **Periodic examinations.**

(a) Periodic medical examinations shall be made available annually.

(b) The scope of the medical examination shall be in conformance with the protocol established in OAR 437-115-155(2)(b), except that the frequency of chest roentgenograms shall be conducted in accordance with Table 2, and the abbreviated standardized questionnaire contained in Appendix D, Part 2, shall be administered to the employe.

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TABLE 2

FREQUENCY OF CHEST ROENTGENOGRAMS

Years since first exposure	Age of Employe		
	15-35	35 + to 45	45 +
0 - 10	every 5 years	every 5 years	every 5 years
10 +	every 5 years	every 2 years	every 1 year

(4) Termination of employment examinations.

(a) The employer shall provide, or make available, a termination of employment medical examination for any employe who has been exposed to airborne concentrations of fibers of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals at or above the action level.

(b) The medical examination shall be in accordance with the requirements of the periodic examinations stipulated in OAR 437-115-155(3), and shall be given within 30 calendar days before or after the date of termination of employment.

(5) **Recent examinations.** No medical examination is required of any employe, if adequate records show that the employe has been examined in accordance with OAR 437-115-155(2) through (4) within the past 1 year period.

(6) **Information provided to the physician.** The employer shall provide the following information to the examining physician:

(a) A copy of this division and Appendices D and E.

(b) A description of the affected employe's duties as they relate to the employe's exposure.

(c) The employe's respresentative exposure level or anticipated exposure level.

(d) A description of any personal protective and respiratory equipment used or to be used.

(e) Information from previous medical examinations of the affected employe that is not otherwise available to the examining physician.

(7) **Physician's written opinion.**

(a) The employer shall obtain a written signed opinion from the examining physician. This written opinion shall contain the results of the medical examination and shall include:

(A) The physician's opinion as to whether the employe has any detected medical conditions that would place the employe at an increased risk of material health impairment from exposure to asbestos, tremolite, anthophyllite, or actinolite;

(B) Any recommended limitations on the employe or upon the use of personal protective equipment such as clothing or respirators; and

(C) A statement that the employe has been informed by the physician of the results of the medical examination and of any medical conditions resulting from asbestos, tremolite, anthophyllite, or actinolite exposure that require further explanation or treatment.

(b) The employer shall instruct the physician not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to asbestos, tremolite, anthophyllite, or actinolite.

(c) The employer shall provide a copy of the physician's written opinion to the affected employe within 30 days from its receipt.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Recordkeeping.

437-115-160 (1) **Exposure measurements.**

(a) The employer shall keep an accurate record of all measurements taken to monitor employe exposure to asbestos, tremolite, anthophyllite, or actinolite as prescribed in OAR 437-115-112.

(b) This record shall include at least the following information:

(A) The date of measurement;

(B) The operation involving exposure to asbestos, tremolite, anthophyllite, or actinolite which is being monitored;

(C) Sampling and analytical methods used and evidence of their accuracy;

(D) Number, duration, and results of samples taken;

(E) Type of respiratory protective devices worn, if any; and

(F) Name, social security number and exposure of the employes whose exposure are represented.

(c) The employer shall maintain this record for at least thirty (30) years, in accordance with OAR 437, Division 200, Employe Access to Exposure and Medical Records, OAR 437-200-010.

(2) **Objective data for exempted operations.**

(a) Where the processing, use, or handling of products made from or containing asbestos, tremolite, anthophyllite, or actinolite is exempted from other requirements of this division under OAR 437-115-112(2)(c), the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.

(b) The record shall include at least the following:

(A) The product qualifying for exemption;

(B) The source of the objective data;

(C) The testing protocol, results of testing, and/or analysis of the material for the release of asbestos, tremolite, anthophyllite, or actinolite;

(D) A description of the operation exempted and how the data support the exemption; and

(E) Other data relevant to the operations, materials, processing, or employe exposures covered by the exemption.

(c) The employer shall maintain this record for the duration of the employer's reliance upon such objective data.

Note: The employer may utilize the services of competent organizations such as industry trade associations and employe associations to maintain the records required by this section.

(3) **Medical surveillance.**

(a) The employer shall establish and maintain an accurate record for each employe subject to medical surveillance by OAR 437-115-155(1)(a), in accordance with OAR 437, Division 200, Employe Access to Exposure and Medical Records.

(b) The record shall include at least the following information:

(A) The name and social security number of the employe;

(B) Physician's written opinions;

(C) Any employe medical complaints related to exposure to asbestos, tremolite, anthophyllite, or actinolite; and

(D) A copy of the information provided to the physician as required by OAR 437-115-155(6).

(c) The employer shall ensure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with OAR 437, Division 200, Employe Access to Exposure and Medical Records.

(4) **Training.** The employer shall maintain all employe training records for one (1) year beyond the last date of employment of that employe.

(5) **Availability.**

(a) The employer, upon written request, shall make all records required to be maintained by these rules available to the Administrator for examination and copying.

(b) The employer, upon request shall make any exposure records required by OAR 437-115-060 available for examination and copying to affected employes, former employes, designated representatives and the Administrator in accordance with OAR 437-200-001 through 025 and OAR 437-200-035 through 045 of Division 200, Employe Access to Exposure and Medical Records.

(c) The employer, upon request, shall make employe medical records required by OAR 437-115-060(2) available for examination and copying to the subject employe, to anyone having the specific written consent of the subject employe, and to the Administrator in accordance with OAR 437-200-040, of Division 200.

(6) **Transfer of records.**

(a) The employer shall comply with the requirements concerning transfer of records set forth in OAR 437, Division 200, Employe Access to Exposure and Medical Records.

(A) Whenever the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Administrator at least 90 days prior to disposal of records and, upon request, transmit them to the Administrator.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Observation of Monitoring

437-115-165 (1) **Employe observation.** The employer shall provide affected employes or their designated representatives an opportunity to observe any monitoring of employe exposure to asbestos, tremolite, anthophyllite, or actinolite conducted in accordance with OAR 437-115-112.

(2) **Observation procedures.** When observation of the monitoring of employe exposure to asbestos, tremolite, anthophyllite, or actinolite requires entry into an area where the use of protective clothing or equipment is required, the observer shall be provided with and be required to use such clothing and equipment and shall comply with all other applicable safety and health procedures.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Appendices

437-115-170 (1) Appendices A, C, D, and E to this division are incorporated as part of these rules and the contents of these Appendices are mandatory.

(2) Appendices B, F, G and H are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

APPENDIX A

OSHA REFERENCE METHOD

MANDATORY

This mandatory appendix specifies the procedure for analyzing air samples for asbestos, tremolite, anthophyllite, and actinolite and specifies quality control procedures that must be implemented by laboratories performing the analysis. The sampling and analytical methods described below represent the elements of the available monitoring methods (such as the NIOSH 7400 method) which OSHA considers to be essential to achieve adequate employe exposure monitoring while allowing employers to use methods that are already established within their organizations. All employers who are required to conduct air monitoring under OAR 437-115-115 of this division are required to utilize analytical laboratories that use this procedure, or an equivalent method, for collecting and analyzing samples.

Sampling and Analytical Procedure

1. The sampling medium for air samples shall be mixed cellulose ester filter membranes. These shall be designated by the manufacturer as suitable for asbestos, tremolite, anthophyllite, and actinolite counting. See below for rejection of blanks.

2. The preferred collection device shall be the 25-mm diameter cassette with an open-faced 50-mm extension cowl. The 37-mm cassette may be used if necessary but only if written justification for the need to use the 37-mm filter cassette accompanies the sample results in the employe's exposure monitoring record.

3. An air flow rate between 0.5 liter/min and 2.5 liters/min shall be selected for the 25-mm cassette. If the 37-mm cassette is used, an air flow rate between 1 liter/min and 2.5 liters/min shall be selected.

4. Where possible, a sufficient air volume for each air sample shall be collected to yield between 100 and 1,300 fibers per square millimeter on the membrane filter. If a filter darkens in appearance or if loose dust is seen on the filter, a second sample shall be started.

5. Ship the samples in a rigid container with sufficient packing material to prevent dislodging the collected fibers. Packing material that has a high electrostatic charge on its surface (e.g., expanded polystyrene) cannot be used because such material can cause loss of fibers to the sides of the cassette.

6. Calibrate each personal sampling pump before and after use with a representative filter cassette installed between the pump and the calibration devices.

7. Personal samples shall be taken in the "breathing zone" of the employe (i.e., attached to or near the collar or lapel near the worker's face).

8. Fiber counts shall be made by positive phase contrast using a microscope with an 8 to 10 X eyepiece and a 40 to 45 X objective for a total magnification of approximately 400 X and a numerical aperture of 0.65 to 0.75. The microscope shall also be fitted with a green or blue filter.

9. The microscope shall be fitted with a Walton-Beckett eyepiece graticule calibrated for a field diameter of 100 micrometers (+/- 2 micrometers).

10. The phase-shift detection limit of the microscope shall be about 3 degrees measured using the HSE phase shift test slide as outlined below.

    a. Place the test slide on the microscope stage and center it under the phase objective.

    b. Bring the blocks of grooved lines into focus.

    Note: The slide consists of seven sets of grooved lines (ca. 20 grooves to each block) in descending order of visibility from sets 1 to 7, seven being the least visible. The requirements for asbestos, tremolite, anthophyllite, and actinolite counting are that the microscope optics must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 and 7 must be invisible. Sets 4 and 5 must be at least partially visible but may vary slightly in visibility between microscopes. A microscope that fails to meet these requirements has either too low or too high a resolution to be used for asbestos, tremolite, anthophyllite, and actinolite counting.

    c. If the image deteriorates, clean and adjust the microscope optics. If the problem persists, consult the microscope manufacturer.

11. Each set of samples taken will include 10 percent blanks or a minimum of 2 blanks. The blank results shall be averaged and subtracted from the analytical results before reporting. Any samples represented by a blank having a fiber count in excess of 7 fibers/100 fields shall be rejected.

12. The samples shall be mounted by the acetone/triacetin method or a method with an equivalent index of refraction and similar clarity.

13. Observe the following counting rules.

    a. Count only fibers equal to or longer than 5 micrometers. Measure the length of curved fibers along the curve.

    b. Count all particles as asbestos, tremolite, anthophyllite, and actinolite that have a length-to-width ratio (aspect ratio) of 3:1 or greater.

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c. Fibers lying entirely within the boundary of the Walton-Beckett graticule field shall receive a count of 1. Fibers crossing the boundary once, having one end within the circle, shall receive the count of one half (1/2). Do not count any fiber that crosses the graticule boundary more than once. Reject and do not count any other fibers even though they may be visible outside the graticule area.

d. Count bundles of fibers as one fiber unless individual fibers can be identified by observing both ends of an individual fiber.

e. Count enough graticule fields to yield 100 fibers. Count a minimum of 20 fields; stop counting at 100 fields regardless of fiber count.

14. Blind recounts shall be conducted at the rate of 10 percent.

Quality Control Procedures

1. Intralaboratory program. Each laboratory and/or each company with more than one microscopist counting slides shall establish a statistically designed quality assurance program involving blind recounts and comparisons between microscopists to monitor the variability of counting by each microscopist and between microscopists. In a company with more than one laboratory, the program shall include all laboratories and shall also evaluate the laboratory-to-laboratory variability.

2. Interlaboratory program. Each laboratory analyzing asbestos, tremolite, anthophyllite, and actinolite samples for compliance determination shall implement an interlaboratory quality assurance program that as a minimum includes participation of at least two other independent laboratories. Each laboratory shall participate in round robin testing at least once every 6 months with at least all the other laboratories in its interlaboratory quality assurance group. Each laboratory shall submit slides typical of its own work load for use in this program. The round robin shall be designed and results analyzed using appropriate statistical methodology.

3. All individuals performing asbestos, tremolite, anthophyllite, and actinolite analysis must have taken the NIOSH course for sampling and evaluating airborne asbestos, tremolite, anthophyllite, and actinolite dust or an equivalent course.

4. When the use of different microscopes contributes to differences between counters and laboratories, the effect of the different microscope shall be evaluated and the microscope shall be replaced, as necessary.

5. Current results of these quality assurance programs shall be posted in each laboratory to keep the microscopists informed.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

APPENDIX B

DETAILED PROCEDURE FOR ASBESTOS, TREMOLITE, ANTHOPHYLLITE AND ACTINOLITE SAMPLING AND ANALYSIS

NON-MANDATORY

This appendix contains a detailed procedure for sampling and analysis and includes those critical elements specified in Appendix A. Employers are not required to use this procedure, but they are required to use Appendix A. The purpose of Appendix B is to provide a detailed step-by-step sampling and analysis procedure that conforms to the elements specified in Appendix A. Since this procedure may also standardize the analysis and reduce variability, APD encourages employers to use this appendix.

Asbestos, Tremolite, Anthophyllite and Actinolite Sampling and Anaylsis Method

TECHNIQUE: MICROSCOPY, PHASE CONTRAST

ANALYTE: Fibers (Manual count)

SAMPLE PREPARATION: Acetone/triacetin method

CALIBRATION: Phase-shift detection limit about 3 degrees

RANGE: 100 to 1300 fibers/mm² filter area

ESTIMATED LIMIT OF DETECTION: 7 fibers/mm² filter area

SAMPLER: Filter (0.8-1.2 um mixed cellulose ester membrane, 25-mm diameter)

FLOW RATE: 0.5 l/min to 2.5 l/min (25-mm cassette)
1.0 l/min to 2.5 l/min (37-mm cassette)

SAMPLE VOLUME: Adjust to obtain 100 to 1300 fibers/mm²

SHIPMENT: Routine

SAMPLE STABILITY: Indefinite

BLANKS: 10% of samples (minimum 2)

STANDARD ANALYTICAL ERROR: 0.25

APPLICABILITY: The working range is 0.02 f/cc (1920-L air sample) to 1.25 f/cc (400-L air sample). The method gives an index of airborne asbestos, tremolite, anthophyllite, and actinolite fibers but may be used for other materials such as fibrous glass by inserting suitable parameters into the counting rules. The method does not differentiate between asbestos, tremolite, anthophyllite, and actinolite and other fibers. Asbestos, tremolite, anthophyllite, and actinolite fibers less than ca. 0.25 um diameter will not be detected by this method.

INTERFERENCES: Any other airborne fiber may interfere since all particles meeting the counting criteria are counted. Chain-like particles may appear fibrous. High levels of nonfibrous dust particles may obscure fibers in the field of view and raise the detection limit.

REAGENTS:

1. Acetone
2. Triacetin (glycerol triacetate), reagent grade

SPECIAL PRECAUTIONS: Acetone is an extremely flammable liquid and precautions must be taken not to ignite it. Heating of acetone must be done in a ventilated laboratory fume hood using a flameless, spark-free heat source.

EQUIPMENT:

1. Collection device: 25-mm cassette with 50-mm extension cowl with cellulose ester filter, 0.8 to 1.2 mm pore size and backup pad.

   Note: Analyze representative filters for fiber background before use and discard the filter lot if more than 5 fibers/100 fields are found.

2. Personal sampling pump, greater than or equal to 0.5 L/min, with flexible connecting tubing.
3. Microscope, phase contrast, with green or blue filter, 8 to 10X eyepiece, and 40 to 45X phase objective (total magnification ca 400X); numerical aperture = 0.65 to 0.75.
4. Slides, glass, single-frosted, pre-cleaned, 25 x 75 mm.
5. Cover slips, 25 x 25 mm, no. 1-1/2 unless otherwise specified by microscope manufacturer.
6. Knife, No. 1 surgical steel, curved blade.
7. Tweezers.
8. Flask, Guth-type, insulated neck, 250 to 500 mL (with single-holed rubber stopper and elbow-jointed glass tubing, 16 to 22 cm long).
9. Hotplate, spark-free, stirring type; heating mantle; or infrared lamp and magnetic stirrer.
10. Syringe, hypodermic, with 22-gauge needle.

11. Graticule, Walton-Beckett type with 100 um diameter circular field at the specimen plane (area = 0.00785 mm^2), (Type G-22).

    Note: The graticule is custom-made for each microscope.

12. HSE/NPL phase contrast test slide, Mark II.

13. Telescope, ocular phase-ring centering.

14. Stage micrometer (0.01 mm divisions).

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.

2. Fasten the sampler to the worker's lapel as close as possible to the worker's mouth. Remove the top cover from the end of the cowl extension (open face) and orient face down. Wrap the joint between the extender and the monitor's body with shrink tape to prevent air leaks.

3. Submit at least two blanks (or 10% of the total samples, whichever is greater) for each set of samples. Remove the caps from the field blank cassettes and store the caps and cassettes in a clean area (bag or box) during the sampling period. Replace the caps in the cassettes when sampling is completed.

4. Sample at 0.5 L/min or greater. Do not exceed 1 mg total dust loading on the filter. Adjust sampling flow rate, Q (L/min), and time to produce a fiber density, E (fibers/mm^2), of 100 to 1300 fibers/m^2 [3.85×10^4 to 5×10^5 fibers per 25-mm filter with effective collection area (A_C = 385 mm^2)] for optimum counting precision (see step 21 below). Calculate the minimum sampling time, $t_{minimum}$ (min) at the action level (one-half of the current standard), L (f/cc) of the fibrous aerosol being sampled:

$$t_{min} = \frac{(A_C)(E)}{(Q)(L)\ 10^3}$$

5. Remove the field monitor at the end of sampling, replace the plastic top cover and small end caps, and store the monitor.

6. Ship the samples in a rigid container with sufficient packing material to prevent jostling or damage.

    Note: Do not use polystyrene foam in the shipping container because of electrostatic forces which may cause fiber loss from the sampler filter.

SAMPLE PREPARATION:

Note: The object is to produce samples with a smooth (non-grainy) background in a medium with a refractive index equal to or less than 1.46. The method below collapses the filter for easier focusing and produces permanent mounts which are useful for quality control and interlaboratory comparison. Other mounting techniques meeting the above criteria may also be used, e.g., the nonpermanent field mounting technique used in P & CAM 239.

7. Ensure that the glass slides and cover slips are free of dust and fibers.

8. Place 40 to 60 ml of acetone into a Guth-type flask. Stopper the flask with a single-hole rubber stopper through which a glass tube extends 5 to 8 cm into the flask. The portion of the glass tube that exits the top of the stopper (8 to 10 cm) is bent downward in an elbow that makes an angle of 20 to 30 degrees with the horizontal.

9. Place the flask in a stirring hotplate or wrap in a heating mantle. Heat the acetone gradually to its boiling temperature (ca. 58° C).

   CAUTION: The acetone vapor must be generated in a ventilated fume hood away from all open flames and spark sources. Alternate heating methods can be used, providing no open flame or sparks are present.

10. Mount either the whole sample filter or a wedge cut from the sample filter on a clean glass slide.

    a. Cut wedges of ca. 25 percent of the filter area with a curved-blade steel surgical knife using a rocking motion to prevent tearing.

    b. Place the filter or wedge, dust side up, on the slide. Static electricity will usually keep the filter on the slide until it is cleared.

    c. Hold the glass slide supporting the filter approximately 1 to 2 cm from the glass tube port where the acetone vapor is escaping from the heated flask. The acetone vapor stream should cause a condensation spot on the glass slide ca. 2 to 3 cm in diameter. Move the glass slide gently in the vapor stream. The filter should clear in 2 to 5 sec. If the filter curls, distorts, or is otherwise rendered unusable, the vapor stream is probably not strong enough. Periodically wipe the outlet port with tissue to prevent liquid acetone dripping onto the filter.

    d. Using the hypodermic syringe with a 22-gauge needle, place 1 to 2 drops of triacetin on the filter. Gently lower a clean 25-mm square cover slip down onto the filter at a slight angle to reduce the possibility of forming bubbles. If too many bubbles form or the amount of triacetin is insufficient, the cover slip may become detached within a few hours.

e. Glue the edges of the cover slip to the glass slide using a lacquer or nail polish.

Note: If clearing is slow, the slide preparation may be heated on a hotplate (surface temperature 50° C) for 15 min to hasten clearing. Counting may proceed immediately after clearing and mounting are completed.

CALIBRATION AND QUALITY CONTROL:

11. Calibration of the Walton-Beckett graticule. The diameter, d_c (mm), of the circular counting area and the disc diameter must be specified when ordering the graticule.

    a. Insert any available graticule into the eyepiece and focus so that the raticule lines are sharp and clear.

    b. Set the appropriate interpupillary distance and, if applicable, reset the binocular head adjustment so that the magnification remains constant.

    c. Install the 40 to 45 X phase objective.

    d. Place a stage micrometer on the microscope object stage and focus the microscope on the graduated lines.

    e. Measure the magnified grid length, L_o (um), using the stage micrometer.

    f. Remove the graticule from the microscope and measure its actual grid length, L_a (mm). This can best be accomplished by using a stage fitted with verniers.

    g. Calculate the circle diameter, d_c (mm), for the Walton-Beckett graticule:

    $$d_c = \frac{L_a \times D}{L_o}$$

    Example: If $L_o = 108$ um, $L_a = 2.93$ mm and $D = 100$ um, then $d_c = 2.71$ mm.

    h. Check the field diameter, D (acceptable range 100 mm ± 2 mm) with a stage micrometer upon receipt of the graticule from the manufacturer. Determine field area (mm^2).

12. Microscope adjustments. Follow the manufacturer's instructions and also the following:

    a. Adjust the light source for even illumination across the field of view at the condenser iris.

Note: Kohler illumination is preferred, where available.

b. Focus on the particulate material to be examined.

c. Make sure that the field iris is in focus, centered on the sample, and open only enough to fully illuminate the field of view.

d. Use the telescope ocular supplied by the manufacturer to ensure that the phase rings (annular diaphragm and phase-shifting elements) are concentric.

13. Check the phase-shift detection limit of the microscope periodically.

a. Remove the HSE/NPL phase-contrast test slide from its shipping container and center it under the phase objective.

b. Bring the blocks of grooved lines into focus.

Note: The slide consists of seven sets of grooves (ca. 20 grooves to each block) in descending order of visibility from sets 1 to 7. The requirements for counting are that the microscope optics must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 to 7 must be invisible. Sets 4 and 5 must be at least partially visible but may vary slightly in visibility between microscopes. A microscope which fails to meet these requirements has either too low or too high a resolution to be used for asbestos, tremolite, anthophyllite, and actinolite counting.

c. If the image quality deteriorates, clean the microscope optics and, if the problem persists, consult the microscope manufacturer.

14. Quality control of fiber counts.

a. Prepare and count field blanks along with the field samples. Report the counts on each blank. Calculate the mean of the field blank counts and subtract this value from each sample count before reporting the results.

Note 1: The identity of the blank filters should be unknown to the counter until all counts have been completed.

Note 2: If a field blank yields fiber counts greater than 7 fibers/100 fields, report possible contamination of the samples.

b. Perform blind recounts by the same counter on 10 percent of filters counted (slides relabeled by a person other than the counter).

15. Use the following test to determine whether a pair of counts on the same filter should be rejected because of possible bias. This statistic estimates the counting repeatability at the 95% confidence level. Discard the sample if the difference between the two counts exceeds 2.77 $(F)S_r$, where F = average of the two fiber counts and S_r = relative standard deviation, which should be derived by each laboratory based on historical in-house data.

Note: If a pair of counts is rejected as a result of this test, recount the remaining samples in the set and test the new counts against the first counts. Discard all rejected paired counts.

16. Enroll each new counter in a training course that compares performance of counters on a variety of samples using this procedure.

    Note: To ensure good reproducibility, all laboratories engaged in asbestos, tremolite, anthophyllite, and actinolite counting are required to participate in the Proficiency Analytical Testing (PAT) Program and should routinely participate with other asbestos, tremolite, anthophyllite, and actinolite fiber counting laboratories in the exchange of field samples to compare performance of counters.

MEASUREMENT:

17. Place the slide on the mechanical stage of the calibrated microscope with the center of the filter under the objective lens. Focus the microscope on the plane of the filter.

18. Regularly check phase-ring alignment and Kohler illumination.

19. The following are the counting rules:

    a. Count only fibers longer than 5 um. Measure the length of curved fibers along the curve.

    b. Count only fibers with a length-to-width ratio equal to or greater than 3:1.

    c. For fibers that cross the boundary of the graticule field, do the following:

        1. Count any fiber longer than 5 um that lies entirely within the graticule area.

        2. Count as 1/2 fiber any fiber with only one end lying within the graticule area.

        3. Do not count any fiber that crosses the graticule boundary more than once.

        4. Reject and do not count all other fibers.

    d. Count bundles of fibers as one fiber unless individual fibers can be identified by observing both ends of a fiber.

    e. Count enough graticule fields to yield 100 fibers. Count a minimum of 20 fields. Stop at 100 fields regardless of fiber count.

20. Start counting from one end of the filter and progress along a radial line to the other end, shift either up or down on the filter, and continue in the reverse direction. Select fields randomly by looking away from the eyepiece briefly while advancing the mechanical stage. When an agglomerate covers ca. 1/6 or more of the field of view, reject the field and select another. Do not report rejected fields in the number of total fields counted.

Note: When counting a field, continuously scan a range of focal planes by moving the fine focus knob to detect very fine fibers which have become embedded in the filter. The small-diameter fibers will be very faint but are an important contribution to the total count.

CALCULATIONS:

21. Calculate and report fiber density on the filter, E (fibers/mm^2); by dividing the total fiber count, F; minus the mean field blank count, B, by the number of fields, n; and the field area, A_f (0.00785 mm^2 for a properly calibrated Walton-Beckett graticule):

$$E = \frac{F - B}{(n)\,(A_f)} \quad \text{fibers/mm}^2$$

22. Calculate the concentration, C (f/cc), of fibers in the air volume sampled, V (L), using the effective collection area of the filter, A_c (385 mm^2 for a 25-mm filter):

$$C = \frac{(E)\,(A_c)}{V\,(10^3)}$$

Note: Periodically check and adjust the value of A_c, if necessary.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

APPENDIX C

QUALITATIVE AND QUANTITATIVE FIT TESTING PROCEDURES

MANDATORY

QUALITATIVE FIT TEST PROTOCOLS

I. Isoamyl Acetate Protocol.

A. Odor Threshold Screening.

1. Three 1-liter glass jars with metal lids (e.g. Mason or Bell jars) are required.

2. Odor-free water (e.g. distilled or spring water) at approximately 25° C shall be used for the solutions.

3. The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 cc of pure IAA to 800 cc of odor free water in a 1-liter jar and shaking for 30 seconds. This solution shall be prepared new at least weekly.

4. The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well ventilated but shall not be connected to the same recirculating ventilation system.

5. The odor test solution is prepared in a second jar by placing 0.4 cc of the stock solution into 500 cc of odor free water using a clean dropper or pipette. Shake for 30 seconds and allow to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution may be used for only one day.

6. A test blank is prepared in a third jar by adding 500 cc of odor free water.

7. The odor test and test blank jars shall be labelled 1 and 2 for jar identification. If the labels are put on the lids they can be periodically peeled, dried off and switched to maintain the integrity of the test.

8. The following instructions shall be typed on a card and placed on the table in front of the two test jars (i.e. 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and

sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

9. The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

10. If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test may not be used.

11. If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

B. Respirator Selection.

1. The test subject shall be allowed to pick the most comfortable respirator from a selection including respirators of various sizes from different manufacturers. The selection shall include at least five sizes of elastomeric half facepieces, from at least two manufacturers.

2. The selection process shall be conducted in a room separate from the fit-test chamber to prevent odor fatigue. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine a "comfortable" respirator. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, as it is only a review.

3. The test subject should understand that the employe is being asked to select the respirator which provides the most comfortable fit. Each respirator represents a different size and shape and, if fit properly and used properly will provide adequate protection.

4. The test subject holds each facepiece up to the face and eliminates those which obviously do not give a comfortable fit. Normally, selection will begin with a half-mask and if a good fit cannot be found, the subject will be asked to test the full facepiece respirators. (A small percentage of users will not be able to wear any half-mask.)

5. The more comfortable facepieces are noted; the most comfortable mask is donned and worn at least five minutes to assess comfort. All donning and adjustments of the facepiece shall be performed by the test subject without assistance from the test conductor or other person. Assistance in assessing comfort can be given by discussing the points in No. 6 below. If the test subject is not familiar with using a particular respirator, the test

subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include reviewing the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

   - Positioning of mask on nose.
   - Room for eye protection.
   - Room to talk.
   - Positioning mask on face and cheeks.

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

   - Chin properly placed.
   - Strap tension.
   - Fit across nose bridge.
   - Distance from nose to chin.
   - Tendency to slip.
   - Self-observation in mirror.

8. The test subject shall conduct the conventional negative and positive-pressure fit checks (e.g. see ANSI Z88.2-1980). Before conducting the negative- or positive-pressure test the subject shall be told to "seat" the mask by rapidly moving the head from side-to-side and up and down, while taking a few deep breaths.

9. The test subject is now ready for fit testing.

10. After passing the fit test, the test subject shall be questioned again regarding the comfort of the respirator. If it has become uncomfortable, another model of respirator shall be tried.

11. The employe shall be given the opportunity to select a different facepiece and be retested if the chosen facepiece becomes increasingly uncomfortable at any time.

C. Fit test

1. The fit test chamber shall be similar to a clear 55 gal drum liner suspended inverted over a 2 foot diameter frame, so that the top of the chamber is about 6 inches above the test subject's head. The inside top center of the chamber shall have a small hook attached.

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2. Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors. The cartridges or masks shall be changed at least weekly.

3. After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

4. A copy of the following test exercises and rainbow passage shall be taped to the inside of the test chamber:

TEST EXERCISES

i. Breathe normally.

ii. Breathe deeply. Be certain breaths are **deep** and **regular**.

iii. Turn head all the way from one side to the other. Inhale on each side. Be certain movement is complete. Do not bump the respirator against the shoulders.

iv. Nod head up-and-down. Inhale when head is in the full up position (looking toward ceiling). Be certain motions are complete and made about every second. Do not bump the respirator on the chest.

v. Talking. Talk aloud and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements, and thus be useful to satisfy this requirement. Alternative passages which serve the same purpose may also be used.

vi. Jogging in place.

vii. Breathe normally.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a person looks for something beyond reach, friends say the person is looking for the pot of gold at the end of the rainbow.

5. Each test subject shall wear the respirator for at a least 10 minutes before starting the fit test.

6. Upon entering the test chamber, the test subject shall be given a 6 inch by 5 inch piece of paper towel or other porous absorbent single ply material, folded in half and wetted with three-quarters of one cc of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber.

7. Allow two minutes for the IAA test concentration to be reached before starting the fit-test exercises. This would be an appropriate time to talk with the test subject, to explain the fit test, the importance of cooperation, the purpose for the head exercises, or to demonstrate some of the exercises.

8. Each exercise described in #4 above shall be performed for at least one minute.

9. If at any time during the test, the subject detects the banana-like odor of IAA, the test has failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

10. If the test is failed, the subject shall return to the selection room and remove the respirator, repeat the odor sensitivity test, select and put on another respirator, return to the test chamber, and again begin the procedure described in the c(4) through c(8) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait about 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

11. If a person cannot cannot pass the fit test described above wearing a half-mask respirator from the available selection, full facepiece models must be used.

12. When a respirator is found that passes the test, the subject breaks the faceseal and takes a breath before exiting the chamber. This is to assure that the reason the test subject is not smelling the IAA is the good fit of the respirator facepiece seal and not olfactory fatigue.

13. When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test. To keep the area from becoming contaminated, the used towels shall be kept in a self-sealing bag so there is no significant IAA concentration buildup in the test chamber during subsequent tests.

14. At least two facepieces shall be selected for the IAA test protocol. The test subject shall be given the opportunity to wear them for one week to choose the one which is more comfortable to wear.

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15. Persons who have successfully passed this fit test with a half-mask respirator may be assigned the use of the test respirator in atmospheres with up to 10 times the PEL of airborne asbestos. In atmospheres greater than 10 times, and less than 100 times the PEL (up to 100 ppm), the subject must pass the IAA test using a full face negative pressure respirator. (The concentation of the IAA inside the test chamber must be increased by ten times for QLFT of the full facepiece.)

16. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

17. If hair growth or apparel interfere with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, or self-contained breathing apparatus.

18. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

19. Qualitative fit testing shall be repeated at least every six months.

20. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the test subject has a:

    (1) Weight change of 20 pounds or more,

    (2) Significant facial scarring in the area of the facepiece seal,

    (3) Significant dental changes; i.e.; multiple extractions without prosthesis, or acquiring dentures,

    (4) Reconstructive or cosmetic surgery, or

    (5) Any other condition that may interfere with facepiece sealing.

D. Recordkeeping

A summary of all test results shall be maintained in each office for 3 years. The summary shall include:

(1) Name of test subject.

(2) Date of testing.

(3) Name of the test conductor.

(4) Respirators selected (indicate manufacturer, model, size and approval number).

(5) Testing agent.

II. Saccharin Solution Aerosol Protocol.

A. Respirator Selection.

Respirators shall be selected as described in section IB (respirator selection) above, except that each respirator shall be equipped with a particulate filter.

B. Taste Threshold Screening.

1. An enclosure about head and shoulders shall be used for threshold screening (to determine if the individual can taste saccharin) and for fit testing. The enclosure shall be approximately 12 inches in diameter by 14 inches tall with at least the front clear to allow free movement of the head when a respirator is worn.
2. The test enclosure shall have a three-quarter inch hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.
3. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.
4. During the threshold screening test, the test subject shall don the test enclosure and breathe with open mouth with tongue extended.
5. Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. This nebulizer shall be clearly marked to distinquish it from the fit test solution nebulizer.
6. The threshold check solution consists of 0.83 grams of sodium saccharin, USP in water. It can be prepared by putting 1 cc of the test solution (see C 7 below) in 100 cc of water.
7. To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then is released and allowed to fully expand.
8. Ten squeezes of the nebulizer bulb are repeated rapidly and then the test subject is asked whether the saccharin can be tasted.

9. If the first response is negative, ten more squeezes of the nebulizer bulb are repeated rapidly and the test subject is again asked whether the saccharin can be tasted.

10. If the second response is negative ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin can be tasted.

11. The test conductor will take note of the number of squeezes required to elicit a taste response.

12. If the saccharin is not tasted after 30 squeezes (Step 10), the saccharin fit test cannot be performed on the test subject.

13. If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

14. Correct use of the nebulizer means that approximately 1 cc of liquid is used at a time in the nebulizer body.

15. The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least every four hours.

C. Fit test.

1. The test subject shall don and adjust the respirator without the assistance from any person.

2. The fit test uses the same enclosure described in IIB above.

3. Each test subject shall wear the respirator for at least 10 minutes before starting the fit test.

4. The test subject shall don the enclosure while wearing the respirator selected in section IB above. This respirator shall be properly adjusted and equipped with a particulate filter.

5. The test subject may not eat drink (except plain water), or chew gum for 15 minutes before the test.

6. A second DeVilbiss Model 40 Inhalation Medication Nebulizer is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinquish it from the screening test solution nebulizer.

7. The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 cc of warm water.

8. As before, the test subject shall breathe with mouth open and tongue extended.

9. The nebulizer is inserted into the hole in the front of the enclosure and the fit test solution is sprayed into the enclosure using the same technique as for the taste threshold screening and the same number of squeezes required to elicit a taste response in the screening. (See B8 through B10 above).

10. After generation of the aerosol read the following instructions to the test subject. The test subject shall perform the exercises for one minute each.

i. Breathe normally.

ii. Breathe deeply. Be certain breaths are deep and regular.

iii. Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against the shoulders.

iv. Nod head up-and-down. Be certain motions are complete. Inhale when head is in the full up position (when looking toward the ceiling). Do not to bump the respirator on the chest.

v. Talking. Talk loudly and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements, and thus be useful to satisfy this requirement. Alternative passages which serve the same purpose may also be used.

vi. Jogging in place.

vii. Breathe normally.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a person looks for something beyond reach, friends say the person is looking for the pot of gold at the end of the rainbow.

11. At the beginning of each exercise, the aerosol concentration shall be replenished using one-half the number of squeezes as initially described in C9.

12. The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected.

13. If the saccharin is detected the fit is deemed unsatisfactory and a different respirator shall be tried.

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14. At least two facepieces shall be selected by the IAA test protocol. The test subject shall be given the opportunity to wear them for one week to choose the one which is more comfortable to wear.

15. Successful completion of the test protocol shall allow the use of the half mask tested respirator in contaminated atmospheres up to 10 times the PEL of asbestos. In other words this protocol may be used to assign protection factors no higher than ten.

16. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

17. If hair growth or apparel interfere with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, or self-contained breathing apparatus.

18. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

19. Qualitative fit testing shall be repeated at least every six months.

20. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the test subject has a:

    (1) Weight change of 20 pounds or more,

    (2) Significant facial scarring in the area of the facepiece seal,

    (3) Significant dental changes; i.e.; multiple extractions without prosthesis, or acquiring dentures,

    (4) Reconstructive or cosmestic surgery, or

    (5) Any other condition that may interfere with facepiece sealing.

D. Recordkeeping

A summary of all test results shall be maintained in each office for 3 years. The summary shall include:

(1) Name of test subject.

(2) Date of testing.

(3) Name of test conductor.

(4) Respirators selected (indicate manufacturer, model, size and approval number).

(5) Testing agent.

III. Irritant Fume Protocol.

A. Respirator selection

Respirators shall be selected as described in section IB above, except that each respirator shall be equipped with a combination of high-efficiency and acid-gas cartridges.

B. Fit test

1. The test subject shall be allowed to smell a weak concentration of the irritant smoke to familiarize the subject with the characteristic odor.
2. The test subject shall properly don the respirator selected as above, and wear it for at least 10 minutes before starting the fit test.
3. The test conductor shall review this protocol with the test subject before testing.
4. The test subject shall perform the conventional positive pressure and negative pressure fit checks (see ANSI Z88.2 1980). Failure of either check shall be cause to select an alternate respirator.
5. Break both ends of a ventilation smoke tube containing stannic oxychloride, such as the MSA part No. 5645, or equivalent. Attach a short length of tubing to one end of the smoke tube. Attach the other end of the smoke tube to a low pressure air pump set to deliver 200 milliliters per minute.
6. Advise the test subject that the smoke can be irritating to the eyes and instruct the subject to keep the eyes closed while the test is performed.
7. The test conductor shall direct the stream of irritant smoke from the tube towards the faceseal area of the test subject. The person conducting the test shall begin with the tube at least 12 inches from the facepiece and gradually move to within one inch, moving around the whole perimeter of the mask.

8. The test subject shall be instructed to do the following exercises while the respirator is being challenged by the smoke. Each exercise shall be performed for one minute.

i. Breathe normally.

ii. Breathe deeply. Be certain breaths are **deep and regular**.

iii. Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against the shoulders.

iv. Nod head up-and-down. Be certain motions are complete and made every second. Inhale when head is in the full up position (looking toward ceiling). Do not bump the respirator against the chest.

v. Talking. Talk aloud and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements, and thus be useful to satisfy this requirement. Alternative passages which serve the same purpose may also be used.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a person looks for something beyond reach, friends say the person is looking for the pot of gold at the end of the rainbow.

vi. Jogging in Place.

vii. Breathe normally.

9. The test subject shall indicate to the test conductor if the irritant smoke is detected. If smoke is detected, the test conductor shall stop the test. In this case, the tested respirator is rejected and another respirator shall be selected.

10. Each test subject passing the smoke test (i.e. without detecting the smoke) shall be given a sensitivity check of smoke from the same tube to determine if the test subject reacts to the smoke. Failure to evoke a response shall void the fit test.

11. Steps B4, B9, B10 of this fit test protocol shall be performed in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by the test agents.

12. At least two facepieces shall be selected by the IAA test protocol. The test subject shall be given the opportunity to wear them for one week to choose the one which is more comfortable to wear.

13. Respirators successfully tested by the protocol may be used in contaminated atmospheres up to ten times the PEL of asbestos.

14. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

15. If hair growth or apparel interfere with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, or self-contained breathing apparatus.

16. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

17. Qualitative fit testing shall be repeated at least every six months.

18. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the test subject has a:

    (1) Weight change of 20 pounds or more,

    (2) Significant facial scarring in the area of the facepiece seal,

    (3) Significant dental changes; i.e.; multiple extractions without prosthesis, or acquiring dentures,

    (4) Reconstructive or cosmestic surgery, or

    (5) Any other condition that may interfere with facepiece sealing.

C. Recordkeeping

A summary of all test results shall be maintained in each office for 3 years. The summary shall include:

(1) Name of test subject.

(2) Date of testing.

(3) Name of test conductor.

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(4) Respirators selected (indicate manufacturer, model, size and approval number).

(5) Testing agent.

QUANTITATIVE FIT TEST PROCEDURES

1. General.

a. The method applies to the negative-pressure nonpowered air-purifying respirators only.

b. The employer shall assign one individual who shall assume the full responsibility for implementing the respirator quantitative fit test program.

2. Definition.

a. "Quantitative Fit Test" means the measurement of the effectiveness of a respirator seal in excluding the ambient atmosphere. The test is performed by dividing the measured concentration of challenge agent in a test chamber by the measured concentration of the challenge agent inside the respirator facepiece when the normal air purifying element has been replaced by an essentially perfect purifying element.

b. "Challenge Agent" means the air contaminant introduced into a test chamber so that its concentration inside and outside the respirator may be compared.

c. "Test Subject" means the person wearing the respirator for quantitative fit testing.

d. "Normal Standing Position" means standing erect and straight with arms down along the sides and looking straight ahead.

e. "Fit Factor" means the ratio of challenge agent concentration outside with respect to the inside of a respirator inlet covering (facepiece or enclosure).

3. Apparatus.

a. **Instrumentation.** Corn oil, sodium chloride or other appropriate aerosol generation, dilution, and measurement systems shall be used for quantitative fit test.

b. **Test chamber.** The test chamber shall be large enough to permit all test subjects to freely perform all required exercises without distributing the challenge agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the challenge agent is effectively isolated from the ambient air yet uniform in concentration throughout the chamber.

c. When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high-efficiency particular filter supplied by the same manufacturer.

d. The sampling instrument shall be selected so that a strip chart record may be made of the test showing the rise and fall of challenge agent concentration with each inspiration and expiration at fit factors of at least 2,000.

e. The combination of substitute air-purifying elements (if any), challenge agent, and challenge agent concentration in the test chamber shall be such that the test subject is not exposed in excess of PEL to the challenge agent at any time during the testing process.

f. The sampling port on the test specimen respirator shall be placed and constructed so that there is no detectable leak around the port, a free air flow is allowed into the sampling line at all times and so there is no interference with the fit or performance of the respirator.

g. The test chamber and test set-up shall permit the person administering the test to observe one test subject inside the chamber during the test.

h. The equipment generating the challenge atmosphere shall maintain the concentration of challenge agent constant within a 10 percent variation for the duration of the test.

i. The time lag (interval between an event and its being recorded on the strip chart) of the instrumentation may not exceed 2 seconds.

j. The tubing for the test chamber atmosphere and for the respirator sampling port shall be the same diameter, length and material. It shall be kept as short as possible. The smallest diameter tubing recommended by the manufacturer shall be used.

k. The exhaust flow from the test chamber shall pass through a high-efficiency filter before release to the room.

l. When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

4. Procedural Requirements

a. The fitting of half-mask respirators should be started with those having multiple sizes and a variety of interchangeable cartridges and canisters such as the MSA Comfo II-M, Norton M, Survivair M, A-O M, or Scott-M. Use either of the tests outlined below to assure that the facepiece is properly adjusted.

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(1) **Positive pressure test.** With the exhaust port(s) blocked, the negative pressure of slight inhalation should remain constant for several seconds.

(2) **Negative pressure test.** With the intake port(s) blocked, the negative pressure slight inhalation should remain constant for several seconds.

b. After a facepiece is adjusted, the test subject shall wear the facepiece for at least 5 minutes before conducting a qualitative test by using either of the methods described below and using the exercise regime described in 5.a., b., c., d. and e.

(1) **Isoamyl acetate test.** When using organic vapor cartridges, the test subject who can smell the odor should be unable to detect the odor of isoamyl acetate squirted into the air near the most vulnerable portions of the facepiece seal. In a location which is separated from the test area, the test subject shall be instructed to close her/his eyes during the test period. A combination cartridge or canister with organic vapor and high-efficiency filters shall be used when available for the particular mask being tested. The test subject shall be given an opportunity to smell the odor of isoamyl acetate before the test is conducted.

(2) **Irritant fume test.** When using high-efficiency filters, the test subject should be unable to detect the odor of irritant fume (stannic chloride or titanium tetrachloride ventilation smoke tubes) squirted into the air near the most vulnerable portions of the facepiece seal. The test subject shall be instructed to close her/his eyes during the test period.

c. The test subject may enter the quantitative testing chamber only if she or he has obtained a satisfactory fit as stated in 4.b. of this Appendix.

d. Before the subject enters the test chamber, a reasonably stable challenge agent concentration shall be measured in the test chamber.

e. Immediately after the subject enters the test chamber, the challenge agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half-mask and 1 percent for a full facepiece.

f. A stable challenge agent concentration shall be obtained prior to the actual start of testing.

(1) Respirator restraining straps may not be overtightened for testing. The straps shall be adjusted by the wearer to give a reasonably comfortable fit typical of normal use.

5. **Exercise Regime.** Prior to entering the test chamber, the test subject shall be given complete instructions as to her/his part in the test procedures. The test subject shall perform the following exercises, in the order given, for each independent test.

   a. **Normal Breathing (NB).** In the normal standing position, without talking, the subject shall breathe normally for at least one minute.

   b. **Deep Breathing (DB).** In the normal standing position the subject shall do deep breathing for at least one minute pausing so as not to hyperventilate.

   c. **Turning head side to side (SS).** Standing in place the subject shall slowly turn his/her head from side to side between the extreme positions to each side. The head shall be held at each extreme position for at least 5 seconds. Perform for at least three complete cycles.

   d. **Moving head up and down(UD).** Standing in place, the subject shall slowly move his/her head up and down between the extreme position straight up and the extreme position straight down. The head shall be held at each extreme position for at least 5 seconds. Perform for at least three complete cycles.

   e. **Reading (R).** The subject shall read out slowly and loud so as to be heard clearly by the test conductor or monitor. The test subject shall read the "rainbow passage" at the end of this section.

   f. **Grimace (G).** The test subject shall grimace, smile, frown, and generally contort the face using the facial muscles. Continue for at least 15 seconds.

   g. **Bend over and touch toes (B).** The test subject shall bend at the waist and touch toes and return to upright position. Repeat for at least 30 seconds.

   h. **Jogging in place (J).** The test subject shall perform jog in place for at least 30 seconds.

   i. **Normal Breathing (NB).** Same as exercise a.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a person looks for something beyond reach, friends say the person is looking for the pot of gold at the end of the rainbow.

6. **The test shall be terminated** whenever any single peak penetration exceeds 5 percent for half-masks and 1 percent for full facepieces. The test subject may be refitted and retested. If two of the three required tests are terminated, the fit shall be deemed inadequate. (See paragraph 4.h.).

7. **Calculation of Fit Factors.**

   a. The fit factor determined by the quantitative fit test equals the average concentration inside the respirator.

   b. The average test chamber concentration is the arithmetic average of the test chamber concentration at the beginning and of the end of the test.

   c. The average peak concentration of the challenge agent inside the respirator shall be the arithmetic average peak concentrations for each of the nine exercises of the test which are computed as the arithmetic average of the peak concentrations found for each breath during the exercise.

   d. The average peak concentration for an exercise may be determined graphically if there is not a great variation in the peak concentrations during a single exercise.

8. **Interpretation of Test Results.** The fit factor measured by the quantitative fit testing shall be the lowest of the three protection factors resulting from three independent tests.

9. **Other Requirements**

   a. The test subject shall not be permitted to wear a half-mask or full facepiece mask if the minimum fit factor of 100 or 1,000, respectively, cannot be obtained. If hair growth or apparel interfere with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, or self-contained breathing apparatus.

   b. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

   c. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

   d. The test subject shall be given the opportunity to wear the assigned respirator for one week. If the respirator does not provide a satisfactory fit during actual use, the test subject may request another QNFT which shall be performed immediately.

e. A respirator fit factor card shall be issued to the test subject with the following information:

(1) Name

(2) Date of fit test.

(3) Protection factors obtained through each manufacturer, model and approval number of respirator tested.

(4) Name and signature of the person that conducted the test.

f. Filters used for qualitative or quantitative fit testing shall be replaced weekly, whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media. Organic vapor cartridges/canisters shall be replaced daily or sooner if there is any indication of breakthrough by the test agent.

10. In addition, because the sealing of the respirator may be affected, quantitative fit testing shall be repeated immediately when the test subject has a:

(1) Weight change of 20 pounds or more,

(2) Significant facial scarring in the area of the facepiece seal,

(3) Significant dental changes; i.e.; multiple extractions without prosthesis, or acquiring dentures,

(4) Reconstructive or cosmetic surgery, or

(5) Any other condition that may interfere with facepiece sealing.

11. Recordkeeping.

A summary of all test results shall be maintained in each office for 3 years. The summary shall include:

(1) Name of test subject.

(2) Date of testing.

(3) Name of the test conductor.

(4) Fit factors obtained from every respirator tested (indicate manufacturer, model, size and approval number).

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

APPENDIX D

MEDICAL QUESTIONNAIRES

MANDATORY

This mandatory appendix contains the medical questionnaires that must be administered to all employes who are exposed to asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals above the action level, and who will therefore be included in their employer's medical surveillance program. Part 1 of the appendix contains the Initial Medical Questionnaire, which must be obtained for all new hires who will be covered by the medical surveillance requirements. Part 2 includes the abbreviated Periodical Medical Questionnaire, which must be administered to all employes who are provided periodic medical examinations under the medical surveillance provisions of the standard.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

Part 1

INITIAL MEDICAL QUESTIONNAIRE

1. NAME ____________________

2. SOCIAL SECURITY No. ___ ___ ___ ___ ___ ___ ___ ___ ___
1 2 3 4 5 6 7 8 9

3. CLOCK NUMBER ___ ___ ___ ___ ___ ___
10 11 12 13 14 15

4. PRESENT OCCUPATION ____________________

5. PLANT ____________________

6. ADDRESS ____________________

7. ____________________
(Zip Code)

8. TELEPHONE NUMBER ____________________

9. INTERVIEWER ____________________

10. DATE ____________________ ___ ___ ___ ___ ___ ___
16 17 18 19 20 21

11. Date of Birth ____________________ ___ ___ ___ ___ ___ ___
Month Day Year 22 23 24 25 26 27

12. Place of Birth ____________________

13. Sex
1. Male ___
2. Female ___

14. What is your marital status?
1. Single ___
2. Married ___
3. Widowed ___
4. Separated/ Divorced ___

15. Race
1. White ___
2. Black ___
3. Asian ___
4. Hispanic ___
5. Indian ___
6. Other ___

16. What is the highest grade completed in school? ____________
(For example 12 years is completion of high school)

OCCUPATIONAL HISTORY

17A. Have you ever worked full time (30 hours per week or more) for 6 months or more? 1. Yes ___ 2. No ___

IF YES TO 17A:

B. Have you ever worked for a year or more in any dusty job? 1. Yes __ 2. No __ 3. Does Not Apply __
Specify job/industry ____________________ Total Years Worked ____________

Was dust exposure: 1. Mild ___ 2. Moderate ___ 3. Severe __

C. Have you ever been exposed to gas or chemical fumes in your work? 1. Yes ___ 2. No __
Specify job/industry ____________________ Total Years Worked ____________

Was exposure: 1. Mild ___ 2. Moderate ___ 3. Severe __

D. What has been your usual occupation or job--the one you have worked at the longest?

1. Job occupation ____

2. Number of years employed in this occupation ____________________

3. Position/job title ____

4. Business, field or industry ________________________________

(Record on lines the years in which you have worked in any of these industries, e.g. 1960-1969)

Have you ever worked:

		YES	NO
E.	In a mine?................................	☐	☐
F.	In a quarry?..............................	☐	☐
G.	In a foundry?.............................	☐	☐
H.	In a pottery?.............................	☐	☐
I.	In a cotton, flax or hemp mill?...........	☐	☐
J.	With asbestos?............................	☐	☐

18. PAST MEDICAL HISTORY

	YES	NO
A. Do you consider yourself to be in good health?	☐	☐

If "NO" state reason ______________________________

B. Have you any defect of vision?............... ☐ ☐

If "YES" state nature of defect ______________________________

C. Have you any hearing defect?................. ☐ ☐

If "YES" state nature of defect ______________________________

D. Are you suffering from or have you ever suffered from:

a. Epilepsy (or fits, seizures, convulsions)? ☐ ☐

b. Rheumatic fever? ☐ ☐

c. Kidney disease? ☐ ☐

d. Bladder disease? ☐ ☐

e. Diabetes? ☐ ☐

f. Jaundice? ☐ ☐

19. CHEST COLDS AND CHEST ILLNESSES

19A. If you get a cold, does it usually go to your chest? (Usually means more than 1/2 the time) 1. Yes __ 2. No __ 3. Don't get colds __

20A. During the past 3 years, have you had any chest illnesses that have kept you off work, indoors at home, or in bed? 1. Yes __ 2. No __

IF YES TO 20A:

B. Did you produce phlegm with any of these chest illnesses? 1. Yes __ 2. No __ 3. Does Not Apply __

C. In the last 3 years, how many such illnesses with (increased) phlegm did you have which lasted a week or more? Number of illnesses __ No such illnesses __

21. Did you have any lung trouble before the age of 16? 1. Yes __ 2. No __

22. Have you ever had any of the following?

1A. Attacks of bronchitis? 1. Yes __ 2. No __

IF YES TO 1A:

B. Was it confirmed by a doctor? 1. Yes __ 2. No __ 3. Does Not Apply __

C. At what age was your first attack? Age in Years __ Does Not Apply __

2A. Pneumonia (include bronchopneumonia)? 1. Yes __ 2. No __

IF YES TO 2A:
B. Was it confirmed by a doctor? 1. Yes __ 2. No __
3. Does Not Apply __

C. At what age did you first have it? Age in Years __
Does Not Apply __

3A. Hay Fever? 1. Yes __ 2. No __

IF YES TO 3A:
B. Was it confirmed by a doctor? 1. Yes __ 2. No __
3. Does Not Apply __

C. At what age did it start? Age in Years __
Does Not Apply __

23A. Have you ever had chronic bronchitis? 1. Yes __ 2. No __

IF YES TO 23A:
B. Do you still have it? 1. Yes __ 2. No __
3. Does Not Apply __

C. Was it confirmed by a doctor? 1. Yes __ 2. No __
3. Does Not Apply __

D. At what age did it start? Age in Years __
Does Not Apply __

24A. Have you ever had emphysema? 1. Yes __ 2. No __

IF YES TO 24A:
B. Do you still have it? 1. Yes __ 2. No __
3. Does Not Apply __

C. Was it confirmed by a doctor? 1. Yes __ 2. No __
3. Does Not Apply __

D. At what age did it start? Age in Years __
Does Not Apply __

25A. Have you ever had asthma? 1. Yes __ 2. No __

IF YES TO 25A:
B. Do you still have it? 1. Yes __ 2. No __
3. Does Not Apply __

C. Was it confirmed by a doctor? 1. Yes __ 2. No __
3. Does Not Apply __

D. At what age did it start? Age in Years ___
Does Not Apply ___

E. If you no longer have it, at what age did it stop? Age stopped ___
Does Not Apply ___

26. Have you ever had:

A. Any other chest illness? 1. Yes ___ 2. No ___

If yes, please specify ______________________________

B. Any chest operations? 1. Yes ___ 2. No ___

If yes, please specify ______________________________

C. Any chest injuries? 1. Yes ___ 2. No ___

If yes, please specify ______________________________

27A. Has a doctor ever told you that you had heart trouble? 1. Yes ___ 2. No ___

IF YES TO 27A:
B. Have you ever had treatment for heart trouble in the past 10 years? 1. Yes ___ 2. No ___
3. Does Not Apply ___

28A. Has a doctor ever told you that you had high blood pressure? 1. Yes ___ 2. No ___

IF YES TO 28A:
B. Have you had any treatment for high blood pressure (hypertension) in the past 10 years? 1. Yes ___ 2. No ___
3. Does Not Apply ___

29. When did you last have your chest X-rayed? (Year) ___ ___ ___ ___
25 26 27 28

30. Where did you last have your chest X-rayed (if known)? ______________

What was the outcome? ______________________________

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FAMILY HISTORY

31. Were either of your natural parents ever told by a doctor that they had a chronic lung condition such as:

	FATHER			MOTHER		
	1. Yes	2. No	3. Don't Know	1. Yes	2. No	3. Don't Know
A. Chronic Bronchitis?	___	___	___	___	___	___
B. Emphysema?	___	___	___	___	___	___
C. Asthma?	___	___	___	___	___	___
D. Lung cancer?	___	___	___	___	___	___
E. Other chest conditions	___	___	___	___	___	___
F. Is parent currently alive?	___	___	___	___	___	___

G. Please Specify ___ Age if Living ___ Age if Living
___ Age at Death ___ Age at Death
___ Don't Know ___ Don't Know

H. Please specify cause of death

________________________________ ________________________

COUGH

32A. Do you usually have a cough? (Count a cough with first smoke or on first going out of doors. Exclude clearing of throat.) [If no, skip to question 32C.] 1. Yes __ 2. No __

B. Do you usually cough as much as 4 to 6 times a day 4 or more days out of the week? 1. Yes __ 2. No __

C. Do you usually cough at all on getting up or first thing in the morning? 1. Yes __ 2. No __

D. Do you usually cough at all during the rest of the day or at night? 1. Yes __ 2. No __

IF YES TO ANY OF ABOVE (32A, B, C, or D), ANSWER THE FOLLOWING. IF NO TO ALL, CHECK DOES NOT APPLY AND SKIP TO NEXT PAGE

E. Do you usually cough like this on most days for 3 consecutive months or more during the year?
1. Yes __ 2. No __
3. Does not apply __

F. For how many years have you had the cough?
Number of years __
Does not apply __

33A. Do you usually bring up phlegm from your chest? (Count phlegm with the first smoke or on first going out of doors. Exclude phlegm from the nose. Count swallowed phlegm.) (If no, skip to 33C)
1. Yes __ 2. No __

B. Do you usually bring up phlegm like this as much as twice a day 4 or more days out of the week?
1. Yes __ 2. No __

C. Do you usually bring up phlegm at all on getting up or first thing in the morning?
1. Yes __ 2. No __

D. Do you usually bring up phlegm at all during the rest of the day or at night?
1. Yes __ 2. No __

IF YES TO ANY OF THE ABOVE (33A, B, C, or D), ANSWER THE FOLLOWING: IF NO TO ALL, CHECK DOES NOT APPLY AND SKIP TO 34A.

E. Do you bring up phlegm like this on most days for 3 consecutive months or more during the year?
1. Yes __ 2. No __
3. Does not apply __

F. For how many years have you had trouble with phlegm?
Number of years __
Does not apply __

EPISODES OF COUGH AND PHLEGM

34A. Have you had periods or episodes of (increased*) cough and phlegm lasting for 3 weeks or more each year?
*(For persons who usually have cough and/or phlegm)
1. Yes __ 2. No __

If YES TO 34A

B. For how long have you had at least 1 such episode per year?
Number of years __
Does not apply __

WHEEZING

35A. Does your chest ever sound wheezy or whistling	
1. When you have a cold?	1. Yes __ 2. No __
2. Occasionally apart from colds?	1. Yes __ 2. No __
3. Most days or nights?	1. Yes __ 2. No __
IF YES TO 1, 2, or 3 in 35A	
B. For how many years has this been present?	Number of years __ Does not apply __
36A. Have you ever had an attack of wheezing that has made you feel short of breath?	1. Yes __ 2. No __
IF YES TO 36A	
B. How old were you when you had your first such attack?	Age in years __ Does not apply __
C. Have you had 2 or more such episodes?	1. Yes __ 2. No __ 3. Does not apply __
D. Have you ever required medicine or treatment for the(se) attack(s)?	1. Yes __ 2. No __ 3. Does not apply __

BREATHLESSNESS

37. If disabled from walking by any condition other than heart or lung disease, please describe and proceed to question 39A.
Nature of condition(s)____

38A. Are you troubled by shortness of breath when hurrying on the level or walking up a slight hill?	1. Yes __ 2. No __
IF YES TO 38A	
B. Do you have to walk slower than people of your age on the level because of breathlessness?	1. Yes __ 2. No __ 3. Does not apply __
C. Do you ever have to stop for breath when walking at your own pace on the level?	1. Yes __ 2. No __ 3. Does not apply __
D. Do you ever have to stop for breath after walking about 100 yards (or after a few minutes) on the level?	1. Yes __ 2. No __ 3. Does not apply __
E. Are you too breathless to leave the house or breathless on dressing or climbing one flight of stairs?	1. Yes __ 2. No __ 3. Does not apply __

TOBACCO SMOKING

39A. Have you ever smoked cigarettes? (No means less than 20 packs of cigarettes or 12 oz. of tobacco in a lifetime or less than 1 cigarette a day for 1 year.)
1. Yes __ 2. No __

IF YES TO 39A

B. Do you now smoke cigarettes (as of one month ago)
1. Yes __ 2. No __
3. Does not apply __

C. How old were you when you first started regular cigarette smoking?
Age in years __
Does not apply __

D. If you have stopped smoking cigarettes completely, how old were you when you stopped?
Age stopped __
Check if still smoking __
Does not apply __

E. How many cigarettes do you smoke per day now?
Cigarettes per day __
Does not apply __

F. On the average of the entire time you smoked, how many cigarettes did you smoke per day?
Cigarettes per day __
Does not apply __

5 G. Do or did you inhale the cigarette smoke?
1. Does not apply __
2. Not at all __
3. Slightly __
4. Moderately __
5. Deeply __

40A. Have you ever smoked a pipe regularly? (Yes means more than 12 oz. of tobacco in a lifetime.)
1. Yes __ 2. No __

IF YES TO 40A:

FOR PERSONS WHO HAVE EVER SMOKED A PIPE

B. 1. How old were you when you started to smoke a pipe regularly?
Age __

2. If you have stopped smoking a pipe completely, how old were you when you stopped?
Age stopped __
Check if still smoking pipe __
Does not apply __

C. On the average over the entire time you smoked a pipe, how much pipe tobacco did you smoke per week?	__ oz. per week (a standard pouch of tobacco contains 1 1/2 oz.) __ Does not apply
D. How much pipe tobacco are you smoking now?	oz. per week __ Not currently smoking a pipe __
E. Do you or did you inhale the pipe smoke?	1. Never smoked __ 2. Not at all __ 3. Slightly __ 4. Moderately __ 5. Deeply __
41A. Have you ever smoked cigars regularly? (Yes means more than 1 cigar a week for a year)	1. Yes __ 2. No __

IF YES TO 41A

FOR PERSONS WHO HAVE EVER SMOKED CIGARS

B. 1. How old were you when you started smoking cigars regularly?	Age __
2. If you have stopped smoking cigars completely, how old were you when you stopped.	Age stopped __ Check if still smoking cigars __ Does not apply __
C. On the average over the entire time you smoked cigars, how many cigars did you smoke per week?	Cigars per week __ Does not apply __
D. How many cigars are you smoking per week now?	Cigars per week __ Check if not smoking cigars currently __
E. Do or did you inhale the cigar smoke?	1. Never smoked __ 2. Not at all __ 3. Slightly __ 4. Moderately __ 5. Deeply __

Signature ______________________ Date ________________

Part 2

PERIODIC MEDICAL QUESTIONNAIRE

1. NAME ______________________________

2. SOCIAL SECURITY No. __ __ __ __ __ __ __ __ __ (1 2 3 4 5 6 7 8 9)

3. CLOCK NUMBER __ __ __ __ __ __ (10 11 12 13 14 15)

4. PRESENT OCCUPATION ______________________

5. PLANT ______________________

6. ADDRESS ______________________

7. ______________________ (Zip Code)

8. TELEPHONE NUMBER ______________________

9. INTERVIEWER ______________________

10. DATE ______________ __ __ __ __ __ __ (16 17 18 19 20 21)

11. What is your marital status?
    1. Single __
    2. Married __
    3. Widowed __
    4. Separated/ Divorced __

12. OCCUPATIONAL HISTORY

12A. In the past year, did you work full time (30 hours per week or more) for 6 months or more? 1. Yes __ 2. No __

IF YES TO 12A:

12B. In the past year, did you work in a dusty job? 1. Yes __ 2. No __ 3. Does Not Apply __

12C. Was dust exposure: 1. Mild __ 2. Moderate __ 3. Severe __

12D. In the past year, were you exposed to gas or chemical fumes in your work? 1. Yes __ 2. No __

12E. Was exposure: 1. Mild __ 2. Moderate __ 3. Severe __

12F. In the past year, what was your:
1. Job/occupation? ____________________
2. Position/job title? ____________________

13. RECENT MEDICAL HISTORY

13A. Do you consider yourself to be in good health? Yes ___ No ___

If NO, state reason ____

13B. In the past year, have you developed:

	Yes	No
Epilepsy?	___	___
Rheumatic fever?	___	___
Kidney disease?	___	___
Bladder disease?	___	___
Diabetes?	___	___
Jaundice?	___	___
Cancer?	___	___

14. CHEST COLDS AND CHEST ILLNESSES

14A. If you get a cold, does it usually go to your chest? (Usually means more than 1/2 the time)
1. Yes ___ 2. No ___
3. Don't get colds ___

15A. During the past year, have you had any chest illnesses that have kept you off work, indoors at home, or in bed?
1. Yes ___ 2. No ___
3. Does Not Apply ___

IF YES TO 15A:

15B. Did you produce phlegm with any of these chest illnesses?
1. Yes ___ 2. No ___
3. Does Not Apply ___

15C. In the past year, how many such illnesses with (increased) phlegm did you have which lasted a week or more?
Number of illnesses ___
No such illnesses ___

16. RESPIRATORY SYSTEM

In the past year have you had:

	Yes or No	Further Comment on Positive Answers
Asthma	____	
Bronchitis	____	
Hay Fever	____	
Other Allergies	____	

	Yes or No	Further Comment on Positive Answers
Pneumonia	____	
Tuberculosis	____	
Chest Surgery	____	
Other Lung Problems	____	
Heart Disease	____	

Do you have:

	Yes or No	Further Comment on Positive Answers
Frequent colds	____	
Chronic cough	____	
Shortness of breath when walking or climbing one flight of stairs	____	
Do you:		
Wheeze	____	
Cough up phlegm	____	
Smoke cigarettes	____	Packs per day ___ How many years ___

Date ________________ Signature ______________________________

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

APPENDIX E

INTERPRETATION AND CLASSIFICATION OF CHEST ROENTGENOGRAMS

MANDATORY

a) Chest roentgenograms shall be interpreted and classified in accordance with a professionally accepted classification system and recorded on a Roentgenographic Interpretation Form. *Form CSD/NIOSH (M) 2.8. (See sample of form on page 78.)

b) Roentgenograms shall be interpreted and classified only by a B-reader, a board eligible/certified radiologist, or an experienced physician with known expertise in pneumoconioses.

c) All interpreters, whenever interpreting chest roentgenograms made under this section, shall have immediately available for reference a complete set of the ILO-U/C International Classification of Radiographs for Pneumoconioses, 1980.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

ROENTGENOGRAPHIC INTERPRETATION

WORKER'S Social Security Number ☐☐☐-☐☐-☐☐☐☐

TYPE OF READING ☐A ☐B ☐P

FACILITY IDENTIFICATION ☐☐☐☐☐

1A. DATE OF X-RAY MONTH ☐☐ DAY ☐☐ YR ☐☐

1B. FILM QUALITY ☐1 ☐2 ☐3 ☐u/r

If Not Grade 1 Give Reason: ______

1C. IS FILM COMPLETELY NEGATIVE? YES ☐ Proceed to Section 5 NO ☐ Proceed to Section 2

2A. ANY PARENCHYMAL ABNORMALITIES CONSISTENT WITH PNEUMOCONIOSIS? YES ☐ COMPLETE 2B and 2C NO ☐ PROCEED TO SECTION 3

2B. SMALL OPACITIES

a. SHAPE/SIZE

PRIMARY: p s / q t / r u

SECONDARY: p s / q t / r u

b. ZONES R L

c. PROFUSION

0/- 0/0 0/1

1/0 1/1 1/2

2/1 2/2 2/3

3/2 3/3 3/+

2C. LARGE OPACITIES

SIZE ☐0 ☐A ☐B ☐C

PROCEED TO SECTION 3

3A. ANY PLEURAL ABNORMALITIES CONSISTENT WITH PNEUMOCONIOSIS? YES ☐ COMPLETE 3B, 3C and 3D NO ☐ PROCEED TO SECTION 4

3B. PLEURAL THICKENING

a. DIAPHRAGM (plaque)

SITE ☐0 ☐R ☐L

b. COSTOPHRENIC ANGLE

SITE ☐0 ☐R ☐L

3C. PLEURAL THICKENING . . . Chest Wall

a. CIRCUMSCRIBED (plaque)

SITE 0 R | 0 L

IN PROFILE

i. WIDTH 0 A B C | 0 A B C

ii. EXTENT 0 1 2 3 | 0 1 2 3

FACE ON

iii. EXTENT 0 1 2 3 | 0 1 2 3

b. DIFFUSE

SITE 0 R | 0 L

IN PROFILE

i. WIDTH 0 A B C | 0 A B C

ii. EXTENT 0 1 2 3 | 0 1 2 3

FACE ON

iii. EXTENT 0 1 2 3 | 0 1 2 3

3D. PLEURAL CALCIFICATION

SITE 0 R EXTENT

a. DIAPHRAGM ______ 0 1 2 3

b. WALL ______ 0 1 2 3

c. OTHER SITES ______ 0 1 2 3

SITE 0 L EXTENT

a. DIAPHRAGM ______ 0 1 2 3

b. WALL ______ 0 1 2 3

c. OTHER SITES ______ 0 1 2 3

PROCEED TO SECTION 4

4A. ANY OTHER ABNORMALITIES? YES ☐ COMPLETE 4B and 4C NO ☐ PROCEED TO SECTION 5

4B. OTHER SYMBOLS (OBLIGATORY)

0 ax bu ca cn co cp cv di ef em es fr hi ho id ih kl od pi px rp tb

Report items which may be of present clinical significance in this section. ☐ od (SPECIFY od.) ______

Date Personal Physician notified? MONTH ☐☐ DAY ☐☐ YR ☐☐

4C. OTHER COMMENTS ______

______

______

______

SHOULD WORKER SEE PERSONAL PHYSICIAN BECAUSE OF COMMENTS IN SECTION 4C ☐YES ☐NO PROCEED TO SECTION 5

5. FILM READER'S INITIALS ☐

PHYSICIAN'S SOCIAL SECURITY NUMBER* ☐☐☐-☐☐-☐☐☐☐

DATE OF READING MONTH ☐☐ DAY ☐☐ YR ☐☐

Complete if social security number is not furnished:

NAME (LAST—FIRST—MIDDLE)

______

STREET ADDRESS CITY STATE ZIP CODE

*Furnishing your social security number is voluntary. Your refusal to provide this number will not affect your right to participate in this program.

CDC/NIOSH (M) 2.8
REV. 4/80

☆ U.S. Government Printing Office 1982—561-646

APPENDIX F

WORK PRACTICES AND ENGINEERING CONTROLS FOR AUTOMOTIVE BRAKE REPAIR OPERATIONS

NON-MANDATORY

This appendix is intended as guidance for employers in the automotive brake and clutch repair industry who wish to reduce their employes' asbestos exposures during repair operations to levels below the new standard's action level (0.1 f/cc). APD believes that employers in this industry sector are likely to be able to reduce their employes' exposures to asbestos by employing the engineering and work practice controls described in Sections A and B of this appendix. Those employers who choose to use these controls and who achieve exposures below the action level will thus be able to avoid any burden that might be imposed by complying with such requirements as medical surveillance, recordkeeping, training, respiratory protection, and regulated areas, which are triggered when employe exposures exceed the action level or PEL.

Asbestos exposure in the automotive brake and clutch repair industry occurs primarily during the replacement of clutch plates and brake pads, shoes, and linings. Asbestos fibers may become airborne when an automotive mechanic removes the asbestos-containing residue that has been deposited as brakes and clutches wear. Employe exposures to asbestos occur during the cleaning of the brake drum or clutch housing.

APD believes that employers engaged in brake repair operations who implement any of the work practices and engineering controls described in Sections A and B of this appendix may be able to reduce their employes' exposures to levels below the action level (0.1 fiber/cc). These control methods and the relevant record evidence on these and other methods are described in the following sections.

A. Enclosed Cylinder/HEPA Vacuum System Method

The enclosed cylinder-vacuum system used in one of the facilities visited by representatives of the National Institute for Occupational Safety and Health (NIOSH) during a health hazard evaluation of brake repair facilities (Ex, 84-263) consists of three components:

(1) A wheel-shaped cylinder designed to cover and enclose the wheel assembly;

(2) A compressed-air hose and nozzle that fits into a port in the cylinder; and

(3) A HEPA-filtered vacuum used to evacuate airborne dust generated within the cylinder by the compressed air. To operate the system, the brake assembly is enclosed in a cylinder that has viewing ports to provide visibility and cotton sleeves through

which the mechanic can handle the brake assembly parts. The cylinder effectively isolates asbestos dust in the drum from the mechanic's breathing zone. The brake assembly isolation cylinder is available from the Nilfisk Company* and comes in two sizes to fit brake drums in the 7-to-12-inch size range common to automobiles and light trucks and the 12-to-19-inch size range common to large commercial vehicles. The cylinder is equipped with built-in compressed-air guns and a connection for a vacuum cleaner equipped with a High Efficiency Particulate Air (HEPA) filter. This type of filter is capable of removing all particles greater than 0.3 microns from the air. When the vacuum cleaner's filter is full, it must be replaced according to the manufacturer's instruction, and appropriate HEPA-filtered dual cartridge respirators should be worn during the process. The filter of the vacuum cleaner is assumed to be contaminated with asbestos fibers and should be handled carefully, wetted with a fine mist of water, placed immediately in a labelled plastic bag, and disposed of properly. When the cylinder is in place around the brake assembly and the HEPA vacuum is connected, compressed air is blown into the cylinder to loosen the residue from the brake assembly parts.

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*Mention of tradenames or commercial products does not constitute endorsement or recommendation for use.

The vacuum then evacuates the loosened material from within the cylinder, capturing the airborne material on the HEPA filter.

The HEPA vacuum system can be disconnected from the brake assembly isolation cylinder when the cylinder is not being used. The HEPA vacuum can then be used for clutch facing work, grinding, or other routine cleaning.

B. Compressed Air/Solvent System Method

A compressed-air hose fitted at the end with a bottle of solvent can be used to loosen the asbestos-containing residue and to capture the resulting airborne particles in the solvent mist. The mechanic should begin spraying the asbestos-contaminated parts with the solvent at a sufficient distance to ensure that the asbestos particles are not dislodged by the velocity of the solvent spray. After the asbestos particles are thoroughly wetted, the spray may be brought closer to the parts and the parts may be sprayed as necessary to remove grease and other material. The automotive parts sprayed with the mist are then wiped with a rag, which must then be disposed of appropriately. Rags should be placed in a labelled plastic bag or other container while they are still wet. This ensures that the asbestos fibers will not become airborne after the brake and clutch parts have been cleaned. (If cleanup rags are laundered rather than disposed of, they must be washed using methods appropriate for the laundering of asbestos-contaminated materials.)

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APD believes that a variant of this compressed-air/solvent mist process offers advantages over the compressed-air/solvent mist technique discussed above, both in terms of costs and employe protection. The variant involves the use of spray cans filled with any of several solvent cleaners commercially available from auto supply stores. Spray cans of solvent are inexpensive, readily available, and easy to use. These cans will also save time, because no solvent delivery system has to be assembled, i.e., no compressed-air hose/mister ensemble. APD believes that a spray can will deliver solvent to the parts to be cleaned with considerably less force than the alternative compressed-air delivery system described above, and will thus generate fewer airborne asbestos fibers than the compressed-air method. The APD therefore believes that the exposure levels of automotive repair mechanics using the spray can/solvent mist process will be even lower than the exposures reported by NIOSH for the compressed-air/solvent mist system (0.08 f/cc).

C. Information on the Effectiveness of Various Control Measures

The amount of airborne asbestos generated during brake and clutch repair operations depends on the work practices and engineering controls used during the repair or removal activity. Data in the rulemaking record document the 8-hour time-weighted average (TWA) asbestos exposure levels associated with various methods of brake and clutch repair and removal. NIOSH submitted a report to the record entitled "Health Hazard Evaluation for Automotive Brake Repair". Additional information provided exposure data for comparing the airborne concentrations of asbestos generated by the use of various work practices during brake repair operations. These reports present exposure data for brake repair operations involving a variety of controls and work practices, including:

- Use of compressed air to blow out the brake drums;
- Use of a brush, without a wetting agent, to remove the asbestos-containing residue;
- Use of a brush dipped in water or a solvent to remove the asbestos-containing residue;
- Use of an enclosed vacuum cleaning system to capture the asbestos-containing residue; and
- Use of a solvent mixture applied with compressed air to remove the residue.

Prohibited Methods

The use of compressed air to blow the asbestos-containing residue off the surface of the brake drum removes the residue effectively but simultaneously produces an airborne cloud of asbestos fibers. According to NIOSH, the peak exposures of mechanics using this technique were as high as 15 fibers/cc, and 8-hour TWA exposures ranged from 0.03 to 0.19 f/cc.

Dr. William J. Nicholson of the Mount Sinai School of Medicine cited data from Knight and Hickish (1970) that indicated that the concentration of asbestos ranged from 0.84 to 5.35 f/cc over a 60-minute sampling period when compressed air was being used to blow out the asbestos-containing residue from the brake drum. In the same study, a peak concentration of 87 f/cc was measured for a few seconds during brake cleaning performed with compressed air. Rohl et al. (1976) measured area concentrations (of unspecified duration) within 3-5 feet of operations involving the cleaning of brakes with compressed air and obtained readings ranging from 6.6 to 29.8 f/cc. Because of the high exposure levels that result from cleaning brake and clutch parts using compressed air, APD has prohibited this practice in the revised standard.

Ineffective Methods

When dry brushing was used to remove the asbestos- containing residue from the brake drums and wheel assemblies, peak exposures measured by NIOSH ranged from 0.61 to 0.81 f/cc, while 8-hour TWA levels were at the new standard's permissible exposure limit (PEL) of 0.2 f/cc. Rohl and his colleagues collected area samples 1-3 feet from a brake cleaning operation being performed with a dry brush, and measured concentrations ranging from 1.3 to 3.6 f/cc; however, sampling times and TWA concentrations were not presented in the Rohl et al. study.

When a brush wetted with water, gasoline, or Stoddart solvent was used to clean the asbestos-containing residue from the affected parts, exposure levels (8-hour TWAs) measured by NIOSH also exceeded the new 0.2 f/cc PEL, and peak exposures ranged as high as 2.62 f/cc.

Preferred Methods

Use of an engineering control system involving a cylinder that completely encloses the brake shoe assembly and a High Efficiency Particulate Air (HEPA) filter-equipped vacuum produced 8-hour TWA employe exposures of 0.01 f/cc and peak exposures ranging from nondetectable to 0.07 f/cc . (Because this system achieved exposure levels below this code's action level, it is described in detail below.) Data collected by the Mount Sinai Medical Center for Nilfisk of America, Inc.*, the manufacturer of the brake assembly enclosure system, showed that for two of three operations sampled, the exposure of mechanics to airborne asbestos fibers was nondetectable. For the third operator sampled by Mt. Sinai researchers, the exposure was 0.5 f/cc, which the authors attributed to asbestos that had contaminated the operator's clothing in the course of previous brake repair operations performed without the enclosed cylinder/vacuum system.

Some automotive repair facilities use a compressed-air hose to apply a solvent mist to remove the asbestos-containing residue from the brake drums before repair. The NIOSH data indicated that mechanics employing this method experienced exposures (8-hour TWAs) of 0.08 f/cc, with peaks of 0.25 to 0.68 f/cc. This technique, and a variant of it that APD believes is both less costly and more effective in reducing employe exposures, is described in greater detail above in Sections A and B.

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*Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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D. Summary

In conclusion, APD believes that it is likely that employers in the brake and clutch repair industry will be able to avail themselves of the action level trigger built into the revised standard if they conscientiously employ one of the three control methods described above: the enclosed cylinder/HEPA vacuum system, the compressed air/solvent method, or the spray can/solvent mist system.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

APPENDIX G

SUBSTANCE TECHNICAL INFORMATION FOR ASBESTOS

NON-MANDATORY

I. Substance Identification

A. Substance: "Asbestos" is the name of a class of magnesium-silicate minerals that occur in fibrous form. Minerals that are included in this group are chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos.

B. Asbestos, tremolite, anthophyllite, and actinolite are used in the manufacture of heat-resistant clothing, automotive brake and clutch linings, and a variety of building materials including floor tiles, roofing felts, ceiling tiles, asbestos-cement pipe and sheet, and fire-resistant drywall. Asbestos is also present in pipe and boiler insulation materials, and in sprayed-on materials located on beams, in crawlspaces, and between walls.

C. The potential for a product containing asbestos, tremolite, anthophyllite, and actinolite to release breatheable fibers depends on its degree of friability. Friable means that the material can be crumbled with hand pressure and is therefore likely to emit fibers. The fibrous or fluffy sprayed-on materials used for fireproofing, insulation, or sound proofing are considered to be friable, and they readily release airborne fibers if disturbed. Materials such as vinyl-asbestos floor tile or roofing felts are considered nonfriable and generally do not emit airborne fibers unless subjected to sanding or sawing operations. Asbestos-cement pipe or sheet can emit airborne fibers if the materials are cut or sawed, or if they are broken during demolition operations.

D. Permissible exposure: Exposure to airborne asbestos, tremolite, anthophyllite, and actinolite fibers may not exceed 0.2 fibers per cubic centimeter of air (0.2 f/cc) averaged over the 8-hour workday.

II. Health Hazard Data

A. Asbestos, tremolite, anthophyllite, and actinolite can cause disabling respiratory disease and various types of cancers if the fibers are inhaled. Inhaling or ingesting fibers from contaminated clothing or skin can also result in these diseases. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.

B. Exposure to asbestos, tremolite, anthophyllite, and actinolite has been shown to cause lung cancer, mesothelioma, and cancer of the stomach and colon. Mesothelioma is a rare cancer of the thin membrane lining of the chest and abdomen. Symptoms of mesothelioma include shortness of breath, pain in the walls of the chest, and/or abdominal pain.

III. Respirators and Protective Clothing

A. Respirators: You are required to wear a respirator when performing tasks that result in asbestos, tremolite, anthophyllite, and actinolite exposure that exceeds the permissible exposure limit (PEL) of 0.2 f/cc. These conditions can occur while your employer is in the process of installing engineering controls to reduce asbestos, tremolite, anthophyllite, and actinolite exposure, or where engineering controls are not feasible to reduce asbestos, tremolite, anthophyllite, and actinolite exposure. Air-purifying respirators equipped with a high-efficiency particulate air (HEPA) filter can be used where airborne asbestos, tremolite, anthophyllite, and actinolite fiber concentrations do not exceed 2 f/cc; otherwise, air-supplied, positive-pressure, full facepiece respirators must be used. Disposable respirators or dust masks are not permitted to be used for asbestos, tremolite, anthophyllite, and actinolite work. For effective protection, respirators must fit your face and head snugly. Your employer is required to conduct fit tests when you are first assigned a respirator and every 6 months thereafter. Respirators should not be loosened or removed in work situations where their use is required.

B. Protective Clothing: You are required to wear protective clothing in work areas where asbestos, tremolite, anthophyllite, and actinolite fiber concentrations exceed the permissible exposure limit (PEL) of 0.2 f/cc to prevent contamination of the skin. Where protective clothing is required, your employer must provide you with clean garments. Unless you are working on a large asbestos, tremolite, anthophyllite, and actinolite removal or demolition project, your employer must also provide a change room and separate lockers for your street clothes and contaminated work clothes. If you are working on a large asbestos, tremolite, anthophyllite, and actinolite removal or demolition project, and where it is feasible to do so, your employer must provide a clean room, shower, and decontamination room contiguous to the work area. When leaving the work area, you must remove contaminated clothing before proceeding to the shower. If the shower is not adjacent to the work area, you must vacuum your clothing before proceeding to the change room and shower. To prevent inhaling fibers in contaminated change rooms and showers, leave your respirator on until you leave the shower and enter the clean change room.

IV. Disposal Procedures and Cleanup

A. Wastes that are generated by processes where asbestos, tremolite, anthophyllite, and actinolite is present include:

1. Empty asbestos, tremolite, anthophyllite, and actinolite shipping containers.

2. Process wastes such as cuttings, trimmings, or reject material.

3. Housekeeping waste from sweeping or vacuuming.

4. Asbestos, tremolite, anthophyllite, and actinolite fireproofing or insulating material that is removed from buildings.

5. Building products that contain asbestos, tremolite, anthophyllite, and actinolite removed during building renovation or demolition.

6. Contaminated disposable protective clothing.

B. Empty shipping bags can be flattened under exhaust hoods and packed into airtight containers for disposal. Empty shipping drums are difficult to clean and should be sealed.

C. Vacuum logs or disposable paper filters should not be cleaned, but should be sprayed with a fine water mist and placed into a labeled waste container.

D. Process waste and housekeeping waste should be wetted with water or a mixture of water and surfactant prior to packaging in disposable containers.

E. Material containing asbestos, tremolite, anthophyllite, and actinolite that is removed from buildings must be disposed of in leak-tight 6-mil thick plastic bags, plastic-lined cardboard containers, or plastic-lined metal containers. These wastes, which are removed while wet, should be sealed in containers before they dry out to minimize the release of asbestos, tremolite, anthophyllite, and actinolite fibers during handling.

V. Access to Information

A. Each year, your employer is required to inform you of the information contained in this standard and appendices for asbestos, tremolite, anthophyllite, and actinolite. In addition, your employer must instruct you in the proper work practices for handling materials containing asbestos, tremolite, anthophyllite, and actinolite and the correct use of protective equipment.

B. Your employer is required to determine whether you are being exposed to asbestos, tremolite, anthophyllite and actinolite. You or your representative has the right to observe employe measurements and to record the results obtained. Your employer is required to inform you of your exposure, and, if you are exposed above the permissible limit, he or she is required to inform you of the actions that are being taken to reduce your exposure to within the permissible limit.

C. Your employer is required to keep records of your exposures and medical examinations. These exposure records must be kept for at least thirty (30) years. Medical records must be kept for the period of your employment plus thirty (30) years, unless the State Archivist requires a longer retention period for public records.

D. Your employer is required to release your exposure and medical records to your physician or designated representative upon your written request.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

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APPENDIX H

MEDICAL SURVEILLANCE GUIDELINES FOR ASBESTOS, TREMOLITE, ANTHOPHYLLITE AND ACTINOLITE

NON-MANDATORY

I. Route of Entry

Inhalation, ingestion

II. Toxicology

Clinical evidence of the adverse effects associated with exposure to asbestos, tremolite, anthophyllite, and actinolite, is present in the form of several well-conducted epidemiological studies of occupationally exposed workers, family contacts of workers, and persons living near asbestos, tremolite, anthophyllite, and actinolite mines. These studies have shown a definite association between exposure to asbestos, tremolite, anthophyllite, and actinolite and an increased incidence of lung cancer, pleural and peritoneal mesothelioma, gastrointestinal cancer, and asbestosis. The latter is a disabling fibrotic lung disease that is caused only by exposure to asbestos. Exposure to asbestos, tremolite, anthophyllite, and actinolite has also been associated with an increased incidence of esophageal, kidney, laryngeal, pharyngeal, and buccal cavity cancers. As with other known chronic occupational diseases, disease associated with asbestos, tremolite, anthophyllite, and actinolite generally appears about 20 years following the first occurrence of exposure: There are no known acute effects associated with exposure to asbestos, tremolite, anthophyllite, and actinolite.

Epidemiological studies indicate that the risk of lung cancer among exposed workers who smoke cigarettes is greatly increased over the risk of lung cancer among non-exposed smokers or exposed nonsmokers. These studies suggest that cessation of smoking will reduce the risk of lung cancer for a person exposed to asbestos, tremolite, anthophyllite, and actinolite but will not reduce it to the same level of risk as that existing for an exposed worker who has never smoked.

III. Signs and Symptoms of Exposure-Related Disease

The signs and symptoms of lung cancer or gastrointestinal cancer induced by exposure to asbestos, tremolite, anthophyllite, and actinolite are not unique, except that a chest X-ray of an exposed patient with lung cancer may show pleural plaques, pleural calcification, or pleural fibrosis. Symptoms characteristic of mesothelioma include shortness of breath, pain in the walls of the chest, or abdominal pain. Mesothelioma has a much longer latency period compared with lung cancer (40 years versus 15-20 years), and mesothelioma is therefore more likely to be found among workers who were first exposed to asbestos at an early age. Mesothelioma is always fatal.

Asbestosis is pulmonary fibrosis caused by the accumulation of asbestos fibers in the lungs. Symptoms include shortness of breath, coughing, fatigue, and vague feelings of sickness. When the fibrosis worsens, shortness of breath occurs even at rest. The diagnosis of asbestosis is based on a history of exposure to asbestos, the presence of characteristic radiologic changes, end-inspiratory crackles (rales), and other clinical features of fibrosing lung disease. Pleural plaques and thickening are observed on X-rays taken during the early stages of the disease. Asbestosis is often a progressive disease even in the absence of continued exposure, although this appears to be a highly individualized characteristic. In severe cases, death may be caused by respiratory or cardiac failure.

IV. Surveillance and Preventive Considerations

As noted above, exposure to asbestos, tremolite, anthophyllite, and actinolite has been linked to an increased risk of lung cancer, mesothelioma, gastro-intestinal cancer, and asbestosis among occupationally exposed workers. Adequate screening tests to determine an employe's potential for developing serious chronic diseases, such as a cancer, from exposure to asbestos, tremolite, anthophyllite, and actinolite do not presently exist. However, some tests, particularly chest X-rays and pulmonary function tests, may indicate that an employe has been overexposed to asbestos, tremolite, anthophyllite, and actinolite, increasing his or her risk of developing exposure-related chronic diseases. It is important for the physician to become familiar with the operating conditions in which occupational exposure to asbestos, tremolite, anthophyllite, and actinolite is likely to occur. This is particularly important in evaluating medical and work histories and in conducting physical examinations. When an active employe has been identified as having been overexposed to asbestos, tremolite, anthophyllite, and actinolite, measures taken by the employer to eliminate or mitigate further exposure should also lower the risk of serious long-term consequences.

The employer is required to institute a medical surveillance program for all employes who are or will be exposed to asbestos, tremolite, anthophyllite, and actinolite at or above the action level (0.1 fiber per cubic centimeter of air) for 30 or more days per year and for all employes who are assigned to wear a negative-pressure respirator. All examinations and procedures must be performed by or under the supervision of a licensed physician, at a reasonable time and place, and at no cost to the employe.

Although broad latitude is given to the physician in prescribing specific tests to be included in the medical surveillance program, APD requires inclusion of the following elements in the routine examination:

(i) Medical and work histories with special emphasis directed to symptoms of the respiratory system, cardiovascular system, and digestive tract.

(ii) Completion of the respiratory disease questionnaire contained in Appendix D.

(iii) A physical examination including a chest roentgenogram and pulmonary function test that includes measurement of the employe's forced vital capacity (FVC) and forced expiratory volume at one second (FEV_1).

(iv) Any laboratory or other test that the examining physician deems by sound medical practice to be necessary.

The employer is required to make the prescribed tests available at least annually to those employes covered; more often than specified if recommended by the examining physician; and upon termination of employment.

The employer is required to provide the physician with the following information: a copy of this standard and appendices; a description of the employe's duties as they relate to asbestos exposure; the employe's representative level of exposure to asbestos, tremolite, anthophyllite, and actinolite; a description of any personal protective and respiratory equipment used; and information from previous medical examinations of the affected employe that is not otherwise available to the physician. Making this information available to the physician will aid in the evaluation of the employe's health in relation to assigned duties and fitness to wear personal protective equipment, if required.

The employer is required to obtain a written opinion from the examining physician containing the results of the medical examination; the physician's opinion as to whether the employe has any detected medical conditions that would place the employe at an increased risk of exposure-related disease; any recommended limitations on the employe or on the use of personal protective equipment; and a statement that the employe has been informed by the physician of the results of the medical examination and of any medical conditions related to asbestos, tremolite, anthophyllite, and actinolite exposure that require further explanation or treatment. This written opinion must not reveal specific findings or diagnoses unrelated to exposure to asbestos, tremolite, anthophyllite, and actinolite, and a copy of the opinion must be provided to the affected employe.

Note: Pursuant to a federal OSHA 9-month administrative stay effective July 21, 1986, enforcement of these rules is stayed as it applies to non-asbestiform tremolite, anthophyllite and actinolite. During the period of this stay the provisions of the 1985 code governing occupational exposure to asbestos (OAR 437-115-004, 005(1)(a) and (b) through 055) will remain in effect with respect to regulation of non-asbestiform tremolite, anthophyllite and actinolite.

Hist: WCD Admin. Order, Safety 3-1987, f. 1/20/87, ef. 2/15/87.

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OREGON OCCUPATIONAL SAFETY AND HEALTH CODE

(Oregon Administrative Rules, Chapter 437)

Division 129

PROTECTIVE EQUIPMENT, APPAREL, AND RESPIRATORS

Effective November 1, 1975

ACCIDENT PREVENTION DIVISION
DEPARTMENT OF INSURANCE AND FINANCE
Salem, Oregon 97310

The Oregon Department of Insurance and Finance adopted these rules pursuant to ORS 654.025(2).

The Secretary of State designated OAR Chapter 437 as the "Oregon Occupational Safety and Health Code." Individual subjects within this code are designated as "Divisions."

Rules in this division of the Oregon Occupational Safety and Health Code are numbered in a uniform system developed by the Secretary of State. This system does not number the rules in sequence (001, 002, 003, etc.). Omitted numbers may be assigned to new rules at the time of their adoption.

A list of all occupational safety and health codes for the State of Oregon is available upon request.

To obtain this list or copies of these codes, address:

Accident Prevention Division
Department of Insurance and Finance
Room 21, Labor and Industries Building
Salem, Oregon 97310

The rules referenced in this division are available for viewing in the Office of the Secretary of State, 121 State Capitol Building, Salem, Oregon 97310, or the Central Office, Accident Prevention Division of the Department of Insurance and Finance, 1st Floor, Labor and Industries Building, Salem, Oregon 97310.

Oregon Administrative Rules are arranged in the following Basic Codification Structure adopted by the Secretary of State:

Chapter	Division	Rule	Section	Subsection	Paragraphs
437	40	010	(1)	(a)	(A) (i) (I) (a) (A) (i) (I)

NOTE: Date at the bottom of each page reflects the effective date of the most recent rule amendment on that page.

A vertical line in the margin indicates a rule has been amended since the last printing of this codebook. Insert pages with amended rules will also contain vertical lines to identify changed areas.

OAR 437

DIVISION 129

PROTECTIVE EQUIPMENT, APPAREL, AND RESPIRATORS

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DIVISION 129

PROTECTIVE EQUIPMENT, APPAREL, AND RESPIRATORS

[Ed. Note: Rules on protective equipment and apparel were first adopted as Chapter 22-069, Protective Equipment and Apparel, in part 22 of the Oregon Occupational Safety and Health Code by WCD Admin. Order, Safety 3-1975, filed 10/6/75, effective 11/1/75. Prior to this time, occupational health rules were administered by the Occupational Health Section of the Health Division, Department of Human Resources. As a direct result of the passage of the Oregon Safe Employment Act (OSEAct) in 1973, these occupational health rules were adopted by the Workmen's Compensation Board (later the Workers' Compensation Department).

Amended by WCD Admin. Order, Safety 4-1979, filed 5/21/79, effective 7/15/79.

Chapter 22-069, Protective Equipment and Apparel, was redesignated as Division 129, Protective Equipment, Apparel, and Respirators, and renumbered by WCD Admin. Order, Safety 5-1984, filed 6/18/84. Its effective date remains 11/1/75.]

Scope

437-129-004 (1) The control of those occupational diseases caused by breathing air contaminated with harmful dust, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination.

(2) This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and location ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to the following requirements.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.
WCD Admin. Order, Safety 5-1984, f. 6/18/84, ef. 11/1/75.

Protective Equipment and Apparel

437-129-010 (1) Workers are required to utilize all special protective equipment or apparel necessary during the period of exposure to harmful or hazardous conditions. Employers and employes shall familiarize themselves with the use, sanitary care and limitations of such equipment.

(2) All necessary protective equipment or apparel used shall be designed and fabricated so that during use the design or fabrication will not constitute a hazard.

(a) Personal protective equipment intended for reuse shall be of such quality as will permit sanitizing without impairment of protective efficiency.

(b) Each employer shall provide the means for sanitization and maintenance of equipment, and only personal protective equipment which has been sanitized shall be issued to workers after having been worn or used by another person, except that which is worn over outer clothing, and does not contact the skin of the wearer.

(3) In all operations where an extreme occupational health hazard will result from equipment failure, suitable personal protective equipment shall be provided at convenient locations throughout the work area. Additional equipment shall be kept in a location outside the area most likely to be affected, and readily available for emergency use.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Respirators, General Requirements

437-129-015 (1) Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employe.

(2) The employer shall provide the respirators which are applicable and suitable for the purpose intended.

(3) The employer shall be responsible for the establishment and maintenance of a respiratory protective program which shall include the requirements outlined in Rule 437-129-025.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Employe Responsibility

437-129-020 The employe shall use the provided respiratory protection in accordance with instructions and training received.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Requirements for a Minimal Acceptable Respiratory Protection Program

437-129-025 (1) Written standard operating procedures governing the selection and use of respirators shall be established.

(2) Respirators shall be selected on the basis of hazards to which the worker is exposed.

(3) The user shall be instructed and trained in the proper use of respirators and their limitations.

(4) Where practicable, the respirators should be assigned to individual workers for their exclusive use.

(5) Respirators shall be regularly cleaned and disinfected. Those issued for the exclusive use of one worker should be cleaned after each day's use, or more often

if necessary. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use.

(6) Respirators shall be stored in a convenient, clean, and sanitary location.

(7) Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use such as self-contained devices shall be thoroughly inspected at least once a month and after each use.

(8) Appropriate surveillance of work area conditions and degree of employe exposure or stress shall be maintained.

(9) There shall be regular inspection and evaluation to determine the continued effectiveness of the program.

(10) Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance annually).

(11) The respirator furnished shall provide adequate respiratory protection against the particular hazard as approved by the National Institute of Occupational Safety and Health (NIOSH). When NIOSH has not established approval mechanisms for a particular respiratory hazard, then other respirators may be accepted for use when proof of acceptable performance is made available.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Selection of Repirators

437-129-030 Proper selection of respirators shall be made according to the guidance of American National Standard Practices for Respiratory Protection Z88.2-1969.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Air Quality

437-129-035 (1) Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Oxygen shall meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen. Breathing air shall meet at least the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Commodity Specification G-7.1-1966. Compressed oxygen shall not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen must never be used with air line respirators.

(2) Breathing air may be supplied to respirators from cylinders or air compressors.

(a) Cylinders shall be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR Part 178).

(b) The compressor for supplying air shall be equipped with necessary safety and standby devices. A breathing air-type compressor shall be used. Compressors shall be constructed and situated so as to avoid entry of contaminated air into the system and suitable in-line air purifying sorbent beds and filters installed to further assure breathing air quality.

(c) A receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in event of compressor failure, and alarms to indicate compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high-temperature alarm is used, the air from the compressor shall be frequently tested for carbon monoxide to insure that it meets the specifications in section (1) of this rule.

(3) Air line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air line respirators with non-respirable gases or oxygen.

(4) Breathing gas containers shall be marked in accordance with American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained, 248.1-1954; Federal Specification BB-A-1034a, June 21, 1968, Air Compressed for Breathing Purposes; or Interim Federal Specification GG-B-00675b, April 27, 1965. Breathing Apparatus, Self-Contained.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Use of Respirators

437-129-040 (1) Standard procedures shall be developed for respirator use. These should include all information and guidance necessary for their proper selection, use, and care. Possible emergency and routine uses of respirators should be anticipated and planned for.

(2) The correct respirator shall be specified for each job. The respirator type is usually specified in the work procedures by a qualified individual supervising the respiratory protective program. The individual issuing them shall be adequately instructed to insure that the correct respirator is issued. Each respirator permanently assigned to an individual should be durably marked to indicate to whom it was assigned. This mark shall not affect the respirator performance in any way. The date of issuance should be recorded.

(3) Written procedures shall be prepared covering safe use of respirators in dangerous atmospheres that might be encountered in normal operations or in emergencies. Personnel shall be familiar with these procedures and the available respirators.

(a) In areas where the wearer, with failure of the respirator, could be overcome by a toxic or oxygen-deficient atmosphere, at least one additional person shall be present. Communications (visual, voice, or signal line) shall be maintained between both or all individuals present. Planning shall be such that one individual will be unaffected by any likely incident and have the proper rescue equipment to be able to assist the other(s) in case of emergency.

(b) When self-contained breathing apparatus or hose masks with blowers are used in atmospheres immediately dangerous to life or health, standby workers must be present with suitable rescue equipment.

(c) Persons using airline respirators in atmospheres immediately hazardous to life or health shall be equipped with safety harnesses and safety lines for lifting or removing persons from hazardous atmospheres or other and equivalent provisions for the rescue of persons from hazardous atmospheres shall be used. A standby worker or workers with suitable self-contained breathing apparatus shall be at the nearest fresh air base for emergency rescue.

(4) Respiratory protection is no better than the respirator in use, even though it is worn conscientiously. Frequent random inspections shall be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned, and maintained.

(5) For safe use of any respirator, it is essential that the user be properly instructed in its selection, use and maintenance. Both supervisors and workers shall be so instructed by competent persons. Training shall provide the workers an opportunity to handle the respirator, have it fitted properly, test its face-piece-to-face seal, wear it in normal air for a long familiarity period, and, finally, wear it in a test atmosphere.

(a) Every respirator wearer shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly. Respirators shall not be worn when conditions prevent a good face seal. Such conditions may be a growth of beard, sideburns, a skull cap that projects under the facepiece, or temple pieces on glasses. Also, the absence of one or both dentures can seriously affect the fit of a facepiece. The worker's diligence in observing these factors shall be evaluated by periodic check. To assure proper protection, the facepiece fit shall be checked by the wearer each time he or she puts on the respirator. This may be done by following manufacturers' facepiece fitting instructions.

(b) Providing respiratory protection for individuals wearing corrective glasses is a serious problem. A proper seal cannot be established if the temple bars of eye glasses extend through the sealing edge of the full facepiece. As a temporary measure, glasses with short temple bars or without temple bars may be taped to the wearer's head. Systems have been developed for mounting corrective lenses inside full facepieces. When a worker must wear corrective lenses as part of the facepiece, the face and lenses shall be fitted by qualified individuals to provide good vision, comfort, and a gas-tight seal.

(c) If corrective spectacles or goggles are required, they shall be worn so as not to affect the fit of the facepiece. Proper selection of equipment will minimize or avoid this problem.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Maintenance and Care of Respirators

437-129-045 (1) A program for maintenance and care of respirators shall be adjusted to the type of plant, working conditions, and hazards involved, and shall include the following basic services:

(a) Inspection for defects (including a leak check);

(b) Cleaning and disinfecting;

(c) Repair;

(d) Storage. Equipment shall be properly maintained to retain its original effectiveness.

(2) Inspection:

(a) All respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but is kept ready for emergency use shall be inspected after each use and at least monthly to assure that it is in satisfactory working condition.

(b) Self-contained breathing apparatus shall be inspected monthly. Air and oxygen cylinders shall be fully charged according to the manufacturer's instructions. It shall be determined that the regulator and warning devices function properly.

(c) Respirators inspection shall include a check of the tightness of connections and the condition of the facepiece, headbands, valves, connecting tube, and canisters. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber or elastomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage.

(d) A record shall be kept of inspection dates and findings for respirators maintained for emergency use.

(3) Cleaning and Disinfecting:

(a) Routinely used respirators shall be cleaned and disinfected as frequently as necessary to insure that proper protection is provided for the wearer. Each worker should be briefed on the cleaning procedure and be assured that he or she will always receive a clean and disinfected respirator. Such assurances are of greatest significance when respirators are not individually assigned to workers.

(b) Respirators maintained for emergency use shall be cleaned and disinfected after each use.

(4) Repairs:

(a) Replacement or repairs shall be done only by experienced persons with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. Reducing or admission valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair.

(5) Storage:

(a) After inspection, cleaning, and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in compartments built for the purpose. The compartments should be clearly marked. Routinely used respirators, such as dust respirators, may be placed in plastic bags. Respirators should not be stored in such places as lockers or tool boxes unless they are in carrying cases or cartons.

(b) Respirators should be packed or stored so that the facepiece and exhalation valve will rest in a normal position and function will not be impaired by the elastomer setting in an abnormal position.

(c) Instructions for proper storage of emergency respirators, such as gas masks and self-contained breathing apparatus, are found in "use and care" instructions usually mounted inside the carrying case lid.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.

Identification of Gas Mask Canisters

437-129-050 (1) The primary means of identifying a gas mask canister shall be by means of properly worded labels. The secondary means of identifying a gas mask canister shall be by a color code.

(2) All who issue or use gas masks falling within the scope of this rule shall see that all gas mask canisters purchased or used by them are properly labeled and colored in accordance with these requirements before they are placed in service and that the labels and colors are properly maintained at all times thereafter until the canisters have completely served their purpose.

(3) (a) On each canister shall appear in bold letters the following:

Canister for

____
(Name of atmospheric contaminant)

or

Type N Gas Mask Canister

(b) In addition, essentially the following wording shall appear beneath the appropriate phrase on the canister label: For respiratory protection in atmospheres containing not more than ________ percent by volume of ________________________________

____
(Name of atmospheric contaminant)

(4) Canisters having a special high-efficiency filter for protection against radionuclides and other highly toxic particulates shall be labeled with a statement of the type and degree of protection afforded by the filter. The label shall be affixed to the neck end of, or to the gray stripe which is around and near the top of, the canister. The degree of protection shall be marked as the percent of penetration of the canister by a 0.3-micron-diameter dioctyl phthalate (DOP) smoke at a flow rate of 85 liters per minute.

(5) Each canister shall be a label warning that gas masks should be used only in atmospheres containing sufficient oxygen to support life (at least 16 percent by volume), since gas mask canisters are only designed to neutralize or remove contaminants from the air.

(6) Each gas mask canister shall be painted a distinctive color or combination of colors indicated in Table I-1. All colors used shall be such that they are clearly identifiable by the user and clearly distinguishable from one another. The color coating used shall offer a high degree of resistance to chipping, scaling, peeling, blistering, fading, and the effects of the ordinary atmospheres to which they may be exposed under normal conditions of storage and use. Appropriately colored pressure sensitive tape may be used for the stripes.

TABLE I-1

Atmospheric contaminants to be protected against	Colors assigned*
Acid gases	White
Hydrocyanic acid gas	White with 1/2-inch green stripe completely around the canister near the bottom.
Chlorine gas	White with 1/2-inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black
Ammonia gas	Green
Acid Gases amd Ammonia Gas	Green with 1/2-inch white stripe completely around the canister near the bottom.
Carbon monoxide	Blue
Acid gases and organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 1/2-inch blue stripe completely around the canister near the bottom.
Acid gases, organic vaors, and ammonia gases	Brown
Radioactive materials, excepting tritium and noble gases	Purple (Magenta)
Particulates (dust, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors	Canister color for contaminant, as designated above, with 1/2-inch gray stripe completely around the canister near the top.
All of the above atmospheric contaminants	Red with 1/2-inch gray stripe completely around the canister near the top.

*Gray should not be assigned as the main color for a canister designed to remove acids or vapors.

Note: Orange shall be used as a complete body, or stripe color to represent gases not included in this table. The user will need to refer to the canister label to determine the degree of protection the canister will afford.

Hist: WCB Admin. Order, Safety 3-1975, f. 10/6/75, ef. 11/1/75.
WCB Admin. Order, Safety 4-1979, f. 5/21/79, ef. 7/15/79.

OREGON OCCUPATIONAL SAFETY AND HEALTH CODE

(Oregon Administrative Rules, Chapter 437)

Division 153

PIPE LABELLING

Effective October 1, 1987

ACCIDENT PREVENTION DIVISION
DEPARTMENT OF INSURANCE AND FINANCE
Salem, Oregon 97310

The Oregon Department of Insurance and Finance adopted these rules pursuant to ORS 654.025(2).

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437	40	010	(1)	(a)	(A) (i) (I) (a) (A) (i) (I)

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OAR 437

DIVISION 153

PIPE LABELLING

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OAR 437

DIVISION 153

PIPE LABELLING

[Historical Note: OAR 437, **Division 153, Pipe Labelling,** was first adopted by WCD Admin. Order, Safety 8, 1986, filed 9/4/86, **effective 10/1/87.]**

GENERAL REQUIREMENTS

Scope and Application

437-153-004 This division shall apply to all piping systems containing hazardous substances or that use asbestos as a pipe insulation material in buildings, structures and workplaces. This division does not apply to buried piping.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Definitions

437-153-005 (1) Hazardous Substances: any substance which is a physical or health hazard.

(2) Health Hazard: a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employes. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosive sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes or mucous membranes.

(3) Physical Hazard: a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

(4) Piping System: includes pipes, single or multiple, of any kind and, in addition, valves and pipe coverings.

(5) Pipes: conduits for the transport of gases, liquids, semiliquids or fine particulate dusts.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Purpose

437-153-007 The purpose of this division is to prescribe minimum labelling requirements for all piping systems which contain hazardous substances, transport substances in a hazardous state, or which use asbestos as a pipe insulation material.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Labelling

437-153-010 (1) Pipes and piping systems which contain hazardous substances or transport substances in a hazardous state shall be labelled in accordance with subsections (a) (b) (c) and (d) or otherwise identified in accordance with subsection (e) of this rule.

(a) Positive identification of the hazardous contents of a piping system shall be by lettered labels. The label shall give the name of the contents in full or abbreviated form.

(b) Contents shall be identified by labelling with sufficient detail to identify the hazard.

(c) Label wording shall be brief, informative and simple.

(d) Labelling shall be accomplished by stencilling, the use of tape, adhesives, markers or approved alternative means.

(e) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual pipes, as long as the alternative method identifies the pipe(s) to which it is applicable and conveys the information required by this rule. The written materials shall be readily accessible to the employes in their work areas during each shift. (OAR 437, Division 155, Hazard Communication, OAR 437-155-020(6).)

(2) Pipes or piping systems which use asbestos as a pipe insulation material shall be labelled in accordance with subsection (a), or otherwise identified in accordance with subsection (b) of this rule (OAR 437-153-010(2)).

(a) The label for pipe insulation containing asbestos shall include the following:

DANGER
CONTAINS ASBESTOS FIBER
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(b) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual pipes, as long as the alternative method identifies the pipe(s) to which it is applicable and conveys the information required by this rule. The written materials shall be readily accessible to the employes in their work areas during each shift. (OAR 437, Division 155, Hazard Communication, OAR 437-155-020(6).)

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Location of Labelling

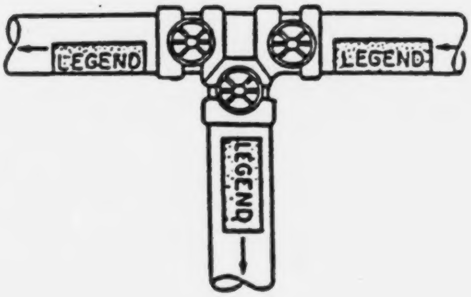
437-153-015 (1) Labelling shall be applied where confusion may occur, such as close to valves or flanges and adjacent to changes in direction, branches and where pipes pass through walls, floors or ceilings.

(2) Labelling shall be applied, at a minimum, at the beginning and end of continuous pipe runs.

(3) For asbestos insulation, labelling shall be at a minimum, on unobstructed continuous pipe runs, every 75 feet.

Illustration 1

LOCATION OF LABELLING



Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Visibility

437-153-025 (1) Where pipes are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal centerline of the pipe.

(2) Where pipes are inaccessible and/or at a distance which precludes clear identification of the letters on labelling, alternatives to the labelling which meet all other requirements of this rule may be used (i.e., schematics posted on walls in work areas).

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

APPENDIX A

(Non-Mandatory)

TABLE 1
CLASSIFICATION OF HAZARDS OF MATERIALS AND SUGGESTIONS OF COLORS

Classification	Color Field **	Color of Letters For Legends
Materials Inherently Dangerous		
Flammable or Explosive	Yellow	Black
Chemically Active or Toxic	Yellow	Black
Extreme Temperatures or Pressures	Yellow	Black
Radioactive	Yellow	Magenta
Materials of Inherently Low Hazard		
Liquid or Liquid Admixture	Green	White
Gas or Gaseous admixture	Blue	White

** Alternatives to the colors suggested by Table 1 may be acceptable if they meet all other requirements of this appendix and are used consistently on all pipes in a given location.

(1) Color may be displayed on the piping by any physical means, but when it is used it shall be in combination with labels.

(2) Color may be used in continuous, total length, or in intermittent displays.

Types and Sizes of Letters

(1) Contrast shall be provided between color field and letters for readability.

(2) Use of letters of block lettering in sizes 1/2 inch (13 mm) and larger, is recommended. (Table 2)

TABLE 2
TYPES AND STYLES OF LETTERS

Outside Diameter of Pipe or Covering		Length of Color Field		Size of Letters	
in.	mm.	in.	mm.	in.	mm.
3/4 to 1 1/4	19 to 32	8	200	1/2	13
1 1/1 to 2	38 to 51	8	200	3/4	19
2 1/2 to 6	64 to 150	12	300	1 1/4	32
8 to 10	200 to 250	24	600	2 1/2	64
over 10	over 250	32	800	3 1/2	89

(3) For identification of materials in pipes less than 3/4 inch (19 mm.) in diameter, and for value and fitting identification, the use of a legible tag is recommended.

Hist: WCD Admin. Order, Safety 8-1986, f. 9/4/86; ef. 10/1/87.

Asbestos Abatement Certification

Section VI: Training Course Accreditation

Accreditation:

Training programs providing certification of small-scale asbestos workers require course approval and accreditation from the Oregon Department of Environmental Quality. Provided in this section are guidelines and applications for course accreditation. Pay close attention to OAR 340-33-060 of the regulations given in the previous Section V. This section entitled "Training Provider Accreditation" describes the requirements for course materials, course design, and instructor credentials. For more information concerning accreditation contact Wendy Sims (229-6414) or Matt McClincy (229-5517) DEQ Portland.

ASBESTOS REQUIREMENTS

AUTHORITY, PURPOSE, & SCOPE

340-33-010 (1) Authority. These rules are promulgated in accordance with and under the authority of ORS 468.893.

(2) Purpose. The purpose of these rules is to provide reasonable standards for:

(a) training and licensing of asbestos abatement project contractors,

(b) training and certification of asbestos abatement project supervisors and workers,

(c) accreditation of providers of training of asbestos contractors, supervisors, and workers,

(d) administration and enforcement of these rules by the Department.

(3) Scope

(a) OAR 340-33-000 through -100 is applicable to all work, including demolition, renovation, repair, construction, or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling, or disposal of any material which could potentially release asbestos fibers into the air; except as provided in (b) and (c) below.

(b) OAR 340-33-000 through -100 do not apply to an asbestos abatement project which is exempt from OAR 340-25-465(4).

(c) OAR 340-33-010 through -100 do not apply to persons performing vehicle brake and clutch maintenance or repair.

(d) Full-scale asbestos abatement projects are differentiated from smaller projects. Small-scale asbestos abatement projects as defined by OAR 340-33-020(17) are limited by job size and include projects,

(A) where the primary intent is to disturb the asbestos-containing material and prescribed work practices are used, and

(B) where the primary intent is not to disturb the asbestos-containing material.

(e) OAR 340-33-000 through -100 provide training, licensing, and certification standards for implementation of OAR 340-25-465, Emission Standards and Procedural Requirements for Asbestos.

DEFINITIONS

340-33-020 As used in these rules,

(1) "Accredited" means a provider of asbestos abatement training courses is authorized by the Department to offer training courses that satisfy requirements for contractor licensing and worker training.

(2) "Agent" means an individual who works on an asbestos abatement project for a contractor but is not an employe of the contractor.

(3) "Asbestos" means the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite and tremolite.

(4) "Asbestos abatement project" means any demolition, renovation, repair, construction or maintenance activity of any public or private facility that involves the repair, enclosure, encapsulation, removal, salvage, handling or

disposal of any asbestos-containing material with the potential of releasing asbestos fibers from asbestos containing material into the air.

Note: Emergency fire fighting is not an asbestos abatement project.

(5) "Asbestos-containing material" means any material containing more than one percent asbestos by weight, including particulate asbestos material.

(6) "Certified" means a worker has met the Department's training, experience, and/or quality control requirements and has a current certification card.

(7) "Contractor" means a person that undertakes for compensation an asbestos abatement project for another person. As used in this subsection, "compensation" means wages, salaries, commissions and any other form of remuneration paid to a person for personal services.

(8) "Commission" means the Environmental Quality Commission.

(9) "Department" means the Department of Environmental Quality.

(10) "Director" means the Director of the Department of Environmental Quality.

(11) "EPA" means the United States Environmental Protection Agency.

(12) "Facility" means all or part of any public or private building, structure, installation, equipment, or vehicle or vessel, including but not limited to ships.

(13) "Friable asbestos material" means any asbestos-containing material that hand pressure can crumble, pulverize or reduce to powder when dry.

(14) "Full-scale asbestos abatement project" means any removal, renovation, encapsulation, repair or maintenance of any asbestos-containing material which could potentially release asbestos fibers into the air, and which is not classified as a small-scale project as defined by (17) below.

(15) "Licensed" means a contracting entity has met the Department's training, experience, and/or quality control requirements to offer and perform asbestos abatement projects and has a current asbestos abatement contractor license.

(16) "Persons" means an individual, public or private corporation, nonprofit corporation, association, firm, partnership, joint venture, business trust, joint stock company, municipal corporation, political subdivision, the state and any agency of the state or any other entity, public or private, however organized.

(17) "Small-scale asbestos abatement project" means small-scale, short-duration projects as defined by (18) below, and/or removal, renovation, encapsulation, repair, or maintenance procedures intended to prevent asbestos containing material from releasing fibers into the air and which:

(a) Remove, encapsulate, repair or maintain less than 40 linear feet or 80 square feet of asbestos-containing material;

(b) Do not subdivide an otherwise full-scale asbestos abatement project into smaller sized units in order to avoid the requirements of these rules;

(c) Utilize all practical worker isolation techniques and other control measures; and

(d) Do not result in worker exposure to an airborne concentration of asbestos in excess of 0.1 fibers per cubic centimeter of air calculated as an eight (8) hour time weighted average.

(18) "Small-scale, short-duration renovating and maintenance activity"

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means a task for which the removal of asbestos is not the primary objective of the job, including, but not limited to:

(a) Removal of quantities of asbestos-containing insulation on pipes;

(b) Removal of small quantities of asbestos-containing insulation on beams or above ceilings;

(c) Replacement of an asbestos-containing gasket on a valve;

(d) Installation or removal of a small section of drywall; or

(e) Installation of electrical conduits through or proximate to asbestos-containing materials.

Small-scale, short duration activities shall be limited to no more than 40 linear feet or 80 square feet of asbestos containing material. An asbestos abatement activity that would otherwise qualify as a full-scale abatement project shall not be subdivided into smaller units in order to avoid the requirements of these rules.

(19) "Trained worker" means a person who has successfully completed specified training and can demonstrate knowledge of the health and safety aspects of working with asbestos.

(20) "Worker" means an employe or agent of a contractor or facility owner or operator.

GENERAL PROVISIONS

340-33-030 (1) Persons engaged in the removal, encapsulation, repair, or enclosure of any asbestos-containing material which has the potential of releasing asbestos fibers into the air must be licensed or certified, unless exempted by OAR 340-33-010(3).

(2) An owner or operator of a facility shall not allow any persons other than those employees of the facility owner or operator who are appropriately certified or a licensed asbestos abatement contractor to perform an asbestos abatement project in or on that facility. Facility owners and operators are not required to be licensed to perform asbestos abatement projects in or on their own facilities.

(3) Any contractor engaged in a full-scale asbestos abatement project must be licensed by the Department under the provisions of OAR 340-33-040.

(4) Any person acting as the supervisor of any full-scale asbestos abatement project must be certified by the Department as a Supervisor for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050.

(5) Any worker engaged in or working on any full-scale asbestos abatement project must be certified by the Department as a Worker for Full-Scale Asbestos Abatement under the provisions of OAR 340-33-050, or as a Supervisor for Full-Scale Asbestos Abatement.

(6) Any contractor or worker engaged in any small-scale asbestos abatement project but not licensed or certified to perform full-scale asbestos abatement projects, must be licensed or certified by the Department as a Small-Scale Asbestos Abatement Contractor or a Worker for Small-Scale Asbestos Abatement, respectively under the provisions of OAR 340-33-040 and -050.

(7) Any provider of training which is intended to satisfy the licensing and certification training requirements of these rules must be accredited by the Department under the provisions of OAR 340-33-060.

(8) Any person licensed, certified, or accredited by the Department under the provisions of these rules shall comply with the appropriate provisions of OAR 340-25-465 and OAR 340-33-000 through -100 and maintain a current address on

file with the Department, or be subject to suspension or revocation of license, or certification, or accreditation.

(9) Asbestos abatement contractors and workers may perform asbestos abatement projects without a license or certificate until January 1, 1989. Thereafter, any contractor or worker engaged in an asbestos abatement project must be licensed or certified by the Department.

(10) The Department may accept evidence of violations of these rules from representatives of other federal, state, or local agencies.

(11) A regional air pollution authority which has been delegated authority under OAR 340-25-460(7) may inspect for and enforce against violations of licensing and certification regulations. A regional air pollution authority may not approve, deny, suspend or revoke a training provider accreditation, contractor license, or worker certification, but may refer violations to the Department and recommend denials, suspensions, or revocations.

(12) An extension of time beyond January 1, 1989, for mandatory contractor licensing, supervisor certification or worker certification may be approved by the Commission if:

(a) Adequate accredited training as required for any of the categories of licensing or certification is not available in the State, and

(b) There is a public health or worker danger created due to inadequate numbers of appropriately licensed or certified persons to properly perform asbestos abatement activities.

(13) Variances from these rules may be granted by the Commission under ORS 468.345.

CONTRACTOR LICENSING

340-33-040 (1) Contractors may be licensed to perform either of the following categories of asbestos abatement projects:

(a) Full-Scale Asbestos Abatement Contractors: All asbestos abatement projects, regardless of project size or duration, or

(b) Small-Scale Asbestos Abatement Contractor: Small-scale asbestos abatement projects.

(2) Application for licenses shall be submitted on forms prescribed by the Department and shall be accompanied by:

(a) Documentation that the contractor, or contractor's employee representative, is certified at the appropriate level by the Department:

(A) Full-scale Asbestos Abatement Contractor license: Certified Supervisor for Full-Scale Asbestos Abatement.

(B) Small-Scale Asbestos Abatement Contractor: Certified Worker for Small-Scale Asbestos Abatement.

(b) Certification that the contractor has read and understands the applicable Oregon and federal rules and regulations on asbestos abatement and agrees to comply with the rules and regulations.

(c) A list of all certificates or licenses, issued to the contractor by any other jurisdiction, that have been suspended or revoked during the past one (1) year, and a list of any asbestos-related enforcement actions taken against the contractor during the past one (1) year.

(d) List any additional project supervisors for full-scale projects and their certification numbers as Supervisors for Full-Scale Asbestos Abatement.

(e) Summary of asbestos abatement projects conducted by the contractor during the past 12 months.

(f) A license application fee.

(3) The Department will review the application for completeness. If the application is incomplete, the Department shall notify the applicant in writing of the deficiencies.

(4) The Department shall deny, in writing, a license to a contractor who has not satisfied the license application requirements.

(5) The Department shall issue a license to the applicant after the license is approved.

(6) The Department shall grant a license for a period of 12 months. Licenses may be extended during Department review of a renewal application.

(7) Renewals:

(a) License renewals must be applied for in the same manner as is required for an initial license.

(b) For renewal, the contractor or employee representative must have completed at least the appropriate annual refresher course.

(c) The complete renewal application shall be submitted no later than 60 days prior to the expiration date.

(8) The Department may suspend or revoke a license if the licensee:

(a) Fraudulently obtains or attempts to obtain a license.

(b) Fails at any time to satisfy the qualifications for a license or comply with the rules adopted by the Commission.

(c) Fails to meet any applicable state or federal standard relating to asbestos abatement.

(d) Permits an untrained or uncertified worker to work on an asbestos abatement project.

(e) Employs a worker who fails to comply with applicable state or federal rules or regulations relating to asbestos abatement.

(9) A contractor who has a license revoked may reapply for a license after demonstrating to the Department that the cause of the revocation has been resolved.

CERTIFICATION

340-33-050 (1) Workers on asbestos abatement projects shall be certified at one or more of the following levels:

(a) Certified Supervisor for Full-Scale Asbestos Abatement.

(b) Certified Worker for Full-Scale Asbestos Abatement.

(c) Certified Worker for Small-Scale Asbestos Abatement.

(2) Application for Certification-General Requirements.

(a) Applications shall be submitted to the provider of the accredited training course within thirty (30) days of completion of the course.

(b) Applications shall be submitted on forms prescribed by the Department and shall be accompanied by the certification fee.

(3) Application to be a Certified Supervisor for Full-Scale Asbestos Abatement shall include:

(a) Documentation that the applicant has successfully completed the Supervisor for Full-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document, and

(b) Documentation that the applicant has been certified as a Worker for Full-Scale Asbestos Abatement and has at least 3 months of full-scale asbestos abatement experience, including time on powered air purifying respirators and experience on at least five separate asbestos abatement projects. The Department shall have the authority to determine if any applicant's experience satisfies

those requirements. Applications for licenses submitted prior to January 1, 1989 shall not be required to include documentation of certification as a worker.

(4) Application to be a Certified Worker for Asbestos Abatement shall include:

(a) Documentation that the applicant to be a Certified Worker for Full-Scale Asbestos Abatement has successfully completed the Worker for Full-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document.

(b) Documentation that the applicant to be a Certified Worker for Small-Scale Asbestos Abatement has successfully completed the Worker for Small-Scale Asbestos Abatement level training and examination as specified in OAR 340-33-070 and the Department guidance document.

(5) Training course providers shall issue certification to an applicant who has fulfilled the requirements of certification.

(6) Certification at all levels is valid for a period of twenty-four (24) months after the date of issue.

(7) Renewals

(a) Certification renewals must be applied for in the same manner as application for original certification.

(b) To gain renewal of certification, a Worker for Full-Scale Asbestos Abatement and a Supervisor for Full-Scale Asbestos Abatement must complete the appropriate annual refresher course no sooner than nine (9) months and no later than twelve (12) months after the issuance date of the certificate, and again no sooner than three (3) months prior to the expiration date of the certificate. A worker may apply in writing to the Department for taking refresher training at some other time than as specified by this paragraph for reasons of work requirements or hardship. The Department shall accept or reject the application in writing.

(c) To gain renewal of certification, a Worker for Small-Scale Asbestos Abatement must comply with the regulations on refresher training which are in effect at the time of renewal. Completion of an accredited asbestos abatement review class may be required if the Environmental Quality Commission determines that there is a need to update the workers' training in order to meet new or changed conditions.

(8) The Department may suspend or revoke a worker's certificate for failure to comply with any state or federal asbestos abatement rule or regulation.

(9) If a certification is revoked, the worker may reapply for another initial certification only after twelve (12) months from the revocation date.

(10) A current worker certification card shall be available for inspection at each asbestos abatement project site for each worker conducting asbestos abatement activities on the site.

TRAINING PROVIDER ACCREDITATION

340-33-060 (1) General

(a) Asbestos training courses required for licensing or certification under these rules may be provided by any person.

(b) Any training provider offering training in Oregon to satisfy these certification and licensing requirements must be accredited by the Department.

(c) Each of the different training courses which are to be used to fulfill training requirements shall be individually accredited by the Department.

(d) The training provider must satisfactorily demonstrate through application and submission of course agenda, faculty resumes, training manuals, examination materials, equipment inventory, and performance during on-site course audits by Department representatives that the provider meets the minimum requirements established by the Department.

(e) The training course sponsor shall limit each class to a maximum of thirty participants unless granted an exception in writing by the Department. The student to instructor ratio for hands-on training shall be equal to or less than ten to one (10:1). To apply for an exception allowing class size to exceed thirty, the course sponsor must submit the following information in writing to the Department for evaluation and approval prior to expanding the class size.

(A) The new class size limit,

(B) The teaching methods and techniques for training the proposed larger class,

(C) The protocol for conducting the written examination, and

(D) Justification for a larger class size.

(f) Course instructors must have academic credentials, demonstrated knowledge, prior training, or field experience in their respective training roles.

(g) The Department may require any accredited training provider to use examinations developed by the Department in lieu of the examinations offered by the training provider.

(h) Training providers seeking accreditation for courses conducted since January 1, 1987, may apply for accreditation of those course offerings as though they were applying for initial accreditation. Contractors and workers trained by these providers since January 1, 1987 may be eligible to use this prior training as satisfaction of the initial training required by these licensing and certification rules.

(i) The Department may require accredited training providers to pay a fee equivalent to reasonable travel expenses for one Department representative to audit any accredited course which is not offered in the State of Oregon for compliance with these regulations. This condition shall be an addition to the standard accreditation application fee.

(2) Application for Accreditation.

(a) Application for accreditation shall be submitted to the Department in writing on forms provided by the Department and attachments. Such applications shall, as a minimum, contain the following information:

A. Name, address, telephone number of the firm, individual(s), or sponsors conducting the course, including the name under which the training provider intends to conduct the training.

B. The type of course(s) for which approval is requested.

C. A detailed course outline showing topics covered and the amount of time given to each topic, including the hands-on skill training.

D. A copy of the course manual, including all printed material to be distributed in the course.

E. A description of teaching methods to be employed, including description of audio-visual materials to be used. The Department may, at its discretion, request that copies of the materials be provided for review. Any audio-visual materials provided to the Department will be returned to the applicant.

F. A description of the hands-on facility to be utilized including protocol for instruction, number of students to be accommodated, the number of instructors, and the amount of time for hands-on skill training.

G. A description of the equipment that will be used during both classroom lectures and hands-on training.

H. A list of all personnel involved in course preparation and presentation and a description of the background, special training and qualification of each, as well as the subject matter covered by each.

I. A copy of each written examination to be given including the scoring methodology to be used in grading the examination; and a detailed statement about the development and validation of the examination.

J. A list of the tuition or other fees required.

K. A sample of the certificate of completion and certification card label.

L. A description of the procedures and policies for re-examination of students who do not successfully complete the training course examination.

M. A list of any states or accrediting systems that approve the training course.

N. A description of student evaluation methods (other than written examination to be used) associated with the hands-on skill training, as applicable.

O. A description of course evaluation methods used by students.

P. Any restriction on attendance such as class size, language, affiliation, and/or target audience of class.

Q. A description of the procedure for issuing replacement certification cards to workers who were issued a certification card or certification card label by the training provider within the previous 12 months and whose cards have been lost or destroyed.

R. Any additional information or documentation as may be required by the Department to evaluate the adequacy of the application.

S. Accreditation application fee.

(b) Application for initial training course accreditation and course materials shall be submitted to the Department at least 45 days prior to the requested approval date.

(c) Upon approval of an initial or refresher asbestos training course, the Department will issue a certificate of accreditation. The certificate is valid for one year from the date of issuance.

(d) Application for renewal of accreditation must follow the procedures described for the initial accreditation. In addition, course instructors must demonstrate that they have maintained proficiency in their instructional specialty and adult training methods during the twelve (12) months prior to renewal.

(3) Denial, Suspension or Revocation of Certificate of Accreditation. The Director may deny, revoke or suspend an application or current accreditation upon finding of sufficient cause. Applicants and certificate holders shall also be advised of the duration of suspension or revocation and any conditions that must be met before certificate reinstatement. Applicants shall have the right to appeal the Director's determination through an administrative hearing in accordance with the provisions of OAR Chapter 340 Division 11. The following may be considered grounds for denial, revocation or suspension:

(a) False statements in the application, omission of required documentation or the omission of information.

(b) Failure to provide or maintain the standards of training required by these regulations.

(c) Failure to provide minimum instruction required by these regulations.

(d) Failure to report to the Department any change in staff or program which substantially deviates from the information contained in the

application.

(e) Failure to comply with the administrative tasks and any other requirement of these regulations.

(4) Training Provider Administrative Tasks. Accredited training providers shall perform the following as a condition of accreditation:

(a) Administer the training course examination only to those students who successfully complete the training course.

(b) Issue a numbered certificate to each students who successfully passes the training course examination. Each certificate shall include the name of the student, name of the course completed, the dates of the course and the examination, name of the training provider, a unique certificate number, and a statement that the student passed the examination.

(c) Issue a photo identification card to each student seeking initial or renewal certification who successfully completes the training course examination and meets all other requirements for certification. The photo identification card shall meet the Department specifications.

(d) Place a label on the back of the photo identification card of each student who successfully completes a refresher training course and examination as required to maintain certification. The label shall meet Department specifications.

(e) Provide to the Department within ten (10) calendar days of the conclusion of each course offering the name, address, telephone number, Social Security Number, course title and dates given, attendance record, exam scores, and course evaluation form of each student attending the course and the certification number, certification fee, and a photograph for each student certified. Record of the information shall be retained by the training provider for a period of three (3) years.

(f) Obtain advance approval from the Department for any changes in the course instructional staff, content, training aids used, facility utilized or other matters which would alter the instruction from that described in the approval application.

(e) Utilize and distribute as part of the course information or training aides furnished by the Department.

(f) Notify the Department in writing at least one week before a training course is scheduled to begin. The notification must include the date, time and address where the training will be conducted.

(g) Establish and maintain course records and documents relating to course accreditation application. Accredited training providers shall make records and documents available to the Department upon request. Training providers whose principle place of business is outside of the State of Oregon shall provide a copy of such records or documents within ten (10) business days of receipt of such a written request from the Department.

(h) Notify the Department prior to issuing a replacement certification card.

(i) Accredited training providers must have their current accreditation certificates at the location where they are conducting training.

GENERAL TRAINING STANDARDS

340-33-070 (1) Courses of instruction required for certification shall be specific for each of the certificate categories and shall be in accordance with Department guidelines. The topics or subjects of instruction which a person must

receive to meet the training requirements must be presented through a combination of lectures, demonstrations, and hands-on practice.

(2) Courses requiring hands-on training must be presented in an environment suitable to permit participants to have actual experience performing tasks associated with asbestos abatement. Demonstrations not involving individual participation shall not substitute for hands-on training.

(3) Persons seeking certification as a Supervisor for Full-Scale Asbestos Abatement shall successfully complete an accredited training course of at least four days as outlined in the DEQ Asbestos Training Guidance Document. The training course shall include lectures, demonstrations, at least six hours of hands-on training, individual respirator fit testing, course review, and a written examination consisting of multiple choice questions. Successful completion of the training shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training.

(4) Any person seeking certification as a Worker for Full-Scale Asbestos Abatement shall successfully complete an accredited training course of at least three days duration as outlined in the DEQ Asbestos Training Guidance Document. The training course shall include lectures, demonstrations, at least six hours of actual hands-on training, individual respirator fit testing, course review, and an examination of multiple choice questions. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training. The course shall adequately address the following topics:

(5) Any person seeking certification as a Worker for Small-Scale Asbestos Abatement shall complete at least a two day approved training course as outlined in the DEQ Asbestos Training Guidance Document. The small-scale asbestos abatement worker course shall include lectures, demonstrations, at least six hours of hands-on training, individual respirator fit testing, course review, and an examination of multiple choice questions. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in the hands-on training.

(6) Refresher training shall be at least one day duration for Certified Supervisors and Workers for Full-Scale Asbestos Abatement and at least three hours duration for Certified Workers for Small-Scale Asbestos Abatement. The refresher courses shall include a review of key areas of initial training, updates, and an examination of multiple choice questions as outlined in the DEQ Asbestos Training Guidance Document. Successful completion of the course shall be demonstrated by achieving a passing score on the examination, course attendance, and full participation in any hands-on training.

(7) One training day shall consist of at least seven hours, of actual classroom instruction and hands-on practice.

PRIOR TRAINING

340-33-080 Successful completion of an initial training course not accredited by the Department may be used to satisfy the training and examination requirements of OAR 340-33-050 and OAR 340-33-060 provided that all of the following conditions are met.

(1) The Department determines that the course and examination requirements are equivalent to or exceed the requirements of OAR 340-33-050 and 340-33-060 and the asbestos training guidance document, for the level of certification sought. State and local requirements may vary.

(2) If the training was completed prior to January 1, 1987, the applicant must demonstrate to the Department that additional experience sufficient to maintain knowledge and skills in asbestos abatement has been obtained in the interim.

(3) The applicant who has received recognition from the Department for alternate initial training successfully completes an Oregon accredited refresher course and refresher course examination for the level of certification sought.

RECIPROCITY

340-33-090 The Department may develop agreements with other jurisdictions for the purposes of establishing reciprocity in training, licensing, and/or certification if the Department finds that the training, licensing and/or certification standards of the other jurisdiction are at least as stringent as those required by these rules.

FEES

340-33-100 (1) Fees shall be assessed to provide revenues to operate the asbestos control program. Fees are assessed for the following:

(a) Contractor Licenses
(b) Worker Certifications
(c) Training Provider Accreditation
(d) Asbestos Abatement Project Notifications

(2) Contractors shall pay a non-refundable license application fee of:

(a) Three hundred dollars ($300) for a one year Full-Scale Asbestos Abatement Contractor license.

(b) Two hundred dollars ($200) for a one year Small-Scale Asbestos Abatement Contractor license.

(3) Workers shall pay a non-refundable certification fee of:

(a) One hundred dollars ($100) for a two year certification as a certified Supervisor for Full-Scale Asbestos Abatement.

(b) Eighty dollars ($80) for a two year certification as a Certified Worker for Full-Scale Asbestos Abatement.

(c) Fifty dollars ($50) for a two year certification as a Certified Worker for Small-Scale Asbestos Abatement.

(4) Training Providers shall pay a non-refundable accreditation application fee of:

(a) One thousand dollars ($1000) for a one year accreditation to provide a course for training supervisors on Full-Scale projects.

(b) Eight hundred dollars ($800) for a one year accreditation to provide a course for training workers on Full-Scale projects.

(c) Five hundred dollars ($500) for a one year accreditation to provide a course for training workers on Small-Scale projects.

(d) Two hundred and fifty dollars ($250) for a one year accreditation to provide a course for refresher training for any level of certification.

(5) Requests for waiver of fees shall be made in writing to the Director, on a case-by-case basis, and be based upon financial hardship. Applicants for waivers must describe the reason for the request and certify financial hardship. The Director may waive part or all of a fee.

Note: The requirements and jurisdiction of the Department of Insurance and Finance, Accident Prevention Division and

any other state agency are not affected by these rules.

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NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

MEMORANDUM

To: Asbestos Training Providers Date: June 13, 1988

From: DEQ Asbestos Control Program

Application forms for asbestos training provider accreditation are enclosed. These forms are being sent to you in response to your interest in becoming a provider of the Oregon training.

The following points should be considered as applications are prepared.

* **Applications should contain all required materials in the required order.** Deficiencies may result in substantial delays in the processing of the application. Application fees are not refundable. Audio-visual materials and visual aids must be submitted but will be returned after evaluation.

* **The training classes must be specific to the Oregon requirements.** Where there is overlap between state and federal requirements, **emphasis should be on placed on the state (DEQ and APD) requirements.** The relationship of these requirements to the federal requirements (OSHA and EPA) should be explained.

* Curriculums should be tailored to the level of training. While most of the topics are common to the three training levels, the coverage of those topics will vary from course to course. **For instance, the small-scale worker will receive the most training in the use of small-scale, short-duration work practices but may only receive awareness-level training on full-scale removal techniques and some types of protective equipment.** The supervisor level should be different throughout the course from the full-scale worker level, rather than being a fourth day added to a worker class.

* **The course schedule must be submitted.** The time spent on each topic must be shown. Topics do not have to be presented in the order given in the regulations. A topic may be broken down into units for presentation at separate times during the course.

* Refresher classes are required annually for full-scale workers and supervisors and initially for those who are already certified in Washington or under any EPA model curriculum-based program. The most important reason for these classes is to **update the worker or supervisor on new work practices, regulations, and other developments. The classes must also teach the Oregon requirements and review key topics of the full training classes.**

Refresher courses must be updated as conditions change in the abatement industry. DEQ will have to be notified as changes are made in these and other courses. In addition, renewal applications submitted in future years for refresher training class accreditation will have to include an analysis of how the course has been updated.

* Classes can exceed the minimum requirements contained in the training guidance document. For example, a full-scale worker class could be designed to meet all requirements for the Washington program and the Oregon program so that students could be certified in both states.

* Instructor credentials should demonstrate both expertise in the training topic and training capabilities.

* Student evaluation of the courses will be required. The evaluation form must be included in the application and include evaluation of each instructor, each training session, written materials, audio-visual materials, training facilities, and hands-on training effectiveness at a minimum.

* The written examinations can be submitted as banks of test questions arranged by topic and with a certain number of questions to be selected from each topic for each test. This will allow the training provider to prepare unique examinations for each class offering or test repeat, without obtaining DEQ approval for each combination.

* Students cannot be permitted to remove test materials from the training facilities. However, training providers may want to review the examination with the students following testing. Training providers should also be prepared to administer tests orally under special circumstances.

* Some students will have to meet special requirements for certification, as outlined below. Training providers will have to ensure that these requirements are met before issuing certifications.

CASE 1. The student is already certified in another state and received initial training after January 1, 1987. If the student is certified in Washington or another state approved by DEQ, the Oregon application must include the certification number, state in which issued, and date of initial training.

CASE 2. The student is already certified under an equivalent program, but received initial training prior to January 1, 1987. The student must demonstrate continuing work experience to DEQ prior to certification through a refresher class. If the student has received DEQ approval prior to coming to a training class, the approval should be noted on the application form and the student can be certified. If the student comes to the class without prior DEQ approval, the student may take the course but will have to wait to take the test until DEQ approval is obtained.

CASE 3. Applicants to be Supervisors for Full-Scale Asbestos Abatement must demonstrate sufficient experience to the DEQ. As above, the DEQ approval must be obtained before the student takes the certification test.

* Changes can be made in accredited training courses only with DEQ approval.

DEQ review of complete training class applications can be expected to take about 30 days. If you have questions about the application process, please contact Wendy Sims at 229-6414 or Matt McClincy at 229-5517.

WLS:k
AK667
Enclosures

BEST COPY AVAILABLE

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

TO: Interested Asbestos Abatement Training Providers

FROM: DEQ Asbestos Control Program

New rules for asbestos abatement have just been adopted for the Department of Environmental Quality. Under the new rules, qualified training providers will be accredited by the DEQ to provide mandatory training for all workers engaged in asbestos abatement. In addition to requiring worker certification and contractor licensing, the rules make significant changes to the notification and work practice requirements for asbestos removal and encapsulation.

If your company is interested in providing accredited asbestos abatement training, these rules specify the requirements that you must meet. Features of the new rules are listed below.

***** WORKER CERTIFICATION** MANDATORY on January 1, 1989
The new rules establish worker training and certification at the full-scale worker, full-scale supervisor, and small-scale worker levels. Any workers doing asbestos abatement will have to be certified through a DEQ-accredited training class and at an appropriate level to do work after December 31, 1988. An annual refresher training class must be completed by each full-scale worker and full-scale supervisor to maintain certification. See OAR 340-33-050.

***** CONTRACTOR LICENSING** MANDATORY on January 1, 1989
Any contractor doing asbestos encapsulation or removal after December 30, 1988, will have to be licensed by the DEQ. Both small-scale asbestos abatement and full-scale asbestos abatement licenses will be available. A contractor must have appropriately -certified workers before applying to the DEQ for a license. See OAR 340-33-040.

***** TRAINING PROVIDER ACCREDITATION** EFFECTIVE IN MAY 1988
The Department will be approving applications from training providers who meet the requirements for providing one or more levels of the mandatory worker training courses. Applications must include the DEQ forms, the appropriate application fee, curriculum and audio-visual materials, background on the training faculty, and other material specified in the rules. Curriculums must comply with the DEQ Asbestos Training Guidance Document. Application forms will be mailed, when available, to anyone who completes and returns the address slip at the end of this notice. See OAR 340-33-070.

*** PRIOR TRAINING EFFECTIVE in May 1988
Provisions have been made to certify workers who have already been trained under the Washington state program, or through an EPA training center. These workers may complete an Oregon refresher training class instead of repeating the initial training. See OAR 340-33-080.

*** 10 DAY NOTIFICATION PERIOD EFFECTIVE June 1, 1988
Complete asbestos abatement notifications must be submitted 10 days prior to the start of the job, unless the project is an emergency involving protection of life, health, or property. Alternative procedures are allowed for small-scale jobs. See OAR 340-25-465(5).

*** NOTIFICATION FEES EFFECTIVE June 1, 1988
Project notification fees have been established. A notification is not considered to be valid unless it contains all the required information, the appropriate fee is submitted, and the DEQ is notified of any subsequent changes. See OAR 340-25-465(5).

*** WORK PRACTICES EFFECTIVE June 1, 1988
Work practice requirements have been rewritten. Some provisions, including the use of HEPA filters on vacuuming and filtration equipment, are new. See OAR 340-25-465(6).

*** WASTE HANDLING AND DISPOSAL EFFECTIVE June 1, 1988
Contractors or owners of facilities where asbestos abatement is done in-house now need to maintain asbestos disposal records, such as landfill receipts. See OAR 340-25-465(13). Nonfriable asbestos waste materials must be disposed of using adequate precautions to prevent the release of asbestos fibers. See OAR 340-25-465(14). No open storage or accumulation of any friable asbestos material is allowed, regardless of the source or condition of the material. See OAR 340-25-465(15).

A set of the new rules for asbestos abatement is also enclosed. Please contact the DEQ Asbestos Control Program if you have any questions.

- -

Yes, I want to receive the DEQ forms for application as a training provider for asbestos abatement.

Name____
Company Name__________________________________
Address______________________________________
____
Phone_______________________________________

Return this form to the DEQ, Asbestos Control Program, 811 SW 6th Avenue, Portland, OR 97204.

AD2738

Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204
Telephone (503)229-5359

FOR DEQ USE ONLY
Date Rec'd: ________________
Amount Rec'd: ______________
Check No.: ________________
Appl. No.: ________________
New Renew Mod ______

ASBESTOS ABATEMENT TRAINING PROVIDER APPLICATION FOR ACCREDITATION

1. TYPE OF TRAINING - CHECK ONE

TYPE OF TRAINING - CHECK ONE			FEE
Supervisor for Full-Scale Asbestos Abatement:	Initial	________	$ 1,000
	Refresher	________	$ 250
Worker for Full-Scale Asbestos Abatement:	Initial	________	$ 800
	Refresher	________	$ 250
Worker for Small-Scale Asbestos Abatement:	Initial	________	$ 500
	Refresher	________	$ 250

Make check for accreditation fee payable to: Department of Environmental Quality. Mail with completed application to address above, ATTN: BUSINESS OFFICE. Contact DEQ for additional requirements if the course will not be offered within the State of Oregon. Use a separate form for each application.

2. OFFICIAL APPLICATION INFORMATION

____

Firm Name: This name will appear on the accreditation and must be the legal Oregon corporate name (i.e., Acme Products)or the legal representative of the company if the company operates under an assumed business name (i.e., John Smith dba Acme Products).

____

Mailing Address City State Zip

________________________ ________________

Contact Person Telephone

Complete both pages of this form and submit with all other materials and information required by Oregon Administrative Rules (OAR) 340-33, in the order listed in OAR 340-33-060(2).

I hereby apply for permission to provide asbestos abatement worker training and issue worker certifications for the State of Oregon as stated or described in this application and certify that the information contained in this application and the exhibits appended hereto are true and correct to the best of my knowledge and belief.

________________________ ________________

Name of owner or legally authorized representative Title

________________________ ________________

Signature Date

3. List any other name(s) under which the course may be offered:

4. List any other asbestos abatement courses for which the applicant has received or applied for DEQ accreditation:

5. List any other agencies which have accredited or approved the core of this course:

6. List anticipated course offering locations:

7. List any restrictions on course attendance in addition to those specified by DEQ:

Asbestos Abatement Certification

Section VII: Professional Contacts

EPA Regional Contacts:

EPA Region 10
1200 6th Avenue
Seattle, WA 98101
(206) 442-2870

Walt Jaspers - (206) 442-2632
(asbestos in schools)
Jerry Chastein - materials (206) 442-8282

Oregon - AHERA State Designated Contact:

Al Shannon
Oregon Department of Education
700 Pringle Parkway, S.E.
Salem, OR 97310
(503)378-6964

Oregon Department of Environmental Quality:

Wendy L. Sims
Asbestos Control Supervisor
Air Quality Division
Program Operations Section
Department of Environmental Quality
811 SW 6th Avenue
Portland,OR 97204

(503) 229-6414 or Dave Waals; Matt McClincy 229-5517
(800) 452-4011

Oregon Department of Insurance and Finance
Accident Prevention Division:

Central Office:

Accident Prevention Division
Labor & Industries Building, Room 204
Salem, OR 97310
(503) 378-3272

Regional Offices:

Region 1 - Portland West
1830 SW Kerr Parkway, Suite 100
Lake Oswego, OR 97305
229-5910

Region 2 - Portland East
1245 SE 122nd Ave., 2nd floor
Portland, OR 97233
257-4302

Region 3 - Salem
3867 Wolverine St. NE, Suite 26
Salem, OR 97305
378-3274

Region 4 - Eugene
2677 Willakenzie, Suite 6
Eugene, OR 97401
686-7562

Region 5 - Bend
2150 NE Studio Rd.
Bend, OR 97701
388-6066

Region 6 - Medford
625 Franquette, Suite B
Medford, OR 97501
776-6030

EPA-Funded Training Programs:

Asbestos Information and Training Centers:

Georgia Institute of Technology	(404) 894-3806
University of Kansas	(913) 491-0181
University of Illinois, Chicago	(312) 996-5762
Tufts University	(617) 381-3531 x5061
University of California at Berkeley	(415) 643-7143
University of Texas at Arlington	(817) 273-2581
UMDNJ Johnson Medical School	(201) 463-4500
Temple University	(215) 787-6479

Additional EPA-Funded Training Programs:

Texas A&M University	(409) 845-6682
University of Cincinnati	(513) 872-5733
University of Florida	(904) 392-9570
University of Utah	(801) 581-5710
National Asbestos Council (NAC)	(404) 292-0629

EPA-Office of Toxic Substances HOTLINE:
(202) 554-1404 or 554-1405

Private Asbestos Abatement Trainers:

The following list of possible asbestos abatement trainers in Oregon is given for informational purposes only. This is an incomplete list and inclusion of a firm on this list does not constitute endorsement by LBCC or the Oregon Department of Education.

Hall-Kimbrell
5319 SW Westgate, Suite 213
Portland, OR 97221
(800) 346-2860

Hazcon, Inc.
16325 SW Boones Ferry Rd., Suite 107
Lake Oswego, OR 97035
(503) 636-7371

National Asbestos Council, Inc.
Training Department
2786 North Decatur Rd., Suite 240
Decatur, GA 30033
(404) 292-3802

National Training Center, Inc.
Asbestos Training Project
123 NW Second Ave., Suite 309
Portland, OR 97209
(503) 224-8834

Asbestos Demolition/Removal Firms:

The following page lists asbestos removal firms that may be sources of information and expertise. Again, this list is incomplete and provided for informational purposes only.

EXTENSION ENERGY PROGRAM STAFF DIRECTORY

April, 1988

The OSU Extension Energy Program offers education, training and technical assistance on conservation and renewable resources to help Oregonians solve energy-related problems. This list provides names, mailing addresses and phone numbers for Extension Energy staff members.

FIELD STAFF:

Northwest Oregon Area
David Brook, Energy Agent
Ted Haskell, Energy Agent
OSU Extension Service
3821 SW Canyon Road (TERA One)
Portland, OR 97221-2755
241-9172

Eastern Oregon Area
David Koller, Energy Agent
OSU Extension Service
Office: Agricultural Service Center
Island City, OR
Mailing Address: Rt. 1 Box 1705
La Grande, OR 97850
963-1010

Central Oregon Area
Tom Wykes, Energy Agent
OSU Extension Service
1128 NW Harriman
Bend, OR 97701
388-6436

West Central Oregon Area
Martin Thompson, Energy Agent
OSU Extension Service
950 West 13th Street
Eugene, OR 97402
687-4243

Southwest Oregon Area
Larry Giardina, Energy Agent
OSU Extension Service
1301 Maple Grove Drive
Medford, OR 97501
776-7371

STATEWIDE STAFF:
David Philbrick
Extension Energy Program Leader
Oregon State University
Batcheller Hall 344
Corvallis, OR 97331-2405
754-3004

Joyce Patterson
Communications Specialist, Energy
Administrative Services Building 422
Corvallis, OR 97331-2119
754-3311

Greg Wheeler
Commercial/Industrial Energy
Specialist and Director,
Energy Analysis & Diagnostic Center
OSU, Batcheller Hall 344
Corvallis, OR 97331-2405
754-2515

W.S. (Gus) Baker
Commercial Energy/Lighting Specialist
OSU, Batcheller Hall 344
Corvallis, OR 97331-2405
754-3004

Lisa Schwartz
Assistant Program Administrator
OSU, Batcheller Hall 344
Corvallis, OR 97331-2405
754-3004

Bryan Boe
Energy Program Building Specialist
PO Box 122
Bend, OR 97709
388-2384

The Oregon State University Extension Energy program is conducted in cooperation with the Oregon Department of Energy with funding from the Bonneville Power Administration and the U.S. Department of Energy. The Extension Service offers its programs and materials equally to all people.

OREGON STATE UNIVERSITY EXTENSION SERVICE

ASBESTOS DEMOLITION/REMOVAL FIRMS

The following is a list provided only as a service. Other firms (unknown at the time of preparation) may provide similar services. The inclusion of a firm on this list does not constitute an endorsement by this office. Services provided and costs are solely determined between firm and customer.

AAMI-OHI
1627 W. 20th Street
Los Angeles, CA 90007
1-800-426-1961

AC & S, Inc.
2151 NW Wilson
Portland, OR 97210
(503) 227-6444

Air Quality Services
P.O. Box 271
Omak, WA 98841
(509) 826-4101

Arrow Industrial Mechanical Company
5107 NE 81st Avenue
Vancouver, WA 98682
(206) 892-1284

Baker Pacific Corporation
3220 East 29th Street
Long Beach, CA
(213) 426-0755

BCP Construction, Inc.
5319 SW Westgate Dr. Suite 253
Portland, OR 97221
(503) 297-7960

Bartells Materials Management, Inc.
3721 NW Front
Portland, OR 97208
(503) 228-9367

Can Environmental
1231 NW Hoyt Suite 205
Portland, OR 97225
(503) 274-9460

Carpenter Contractors, Inc.
Route 4, Box 49
Hillsboro, OR 97123
(503) 628-2488

Cascade Industrial Maintenance
2406 NE 100th
Vancouver, WA 98686
(206) 574-0561

Cascade Insulation, Inc.
P.O. Box 6498
Bend, OR 97708
(503) 388-2600

Central Painting, Inc.
4749 West Marginal Way, SW
Seattle, WA 98106
(206) 932-8116

Certified Asbestos Removal
12604 NE 172nd Avenue
Brush Prairie, WA 98606
(206) 254-4893

Crosby & Overton, Inc.
5420 N. Lagoon
Portland, OR 97217
(503) 283-1150

Cyclops Pipeline Service
P.O. Box 297
Wilsonville, OR 97070
(503) 682-7882

D2 Services
411 Bowmont Circle
Medford, OR 97504
(503) 773-1177

Fiberglass Maintenance Contractors
2300 SE 3rd Loop
Vancouver, WA 98661
(206) 573-7136

Form Contracting
P.O. Box 126
Harrisburg, OR 97446
(503) 995-6448

Indoor Environmental Services
P.O. Box 3397
Gresham, OR 97030
(503) 667-9056

Insulation Specialists
11965 SW Summercrest Drive
Tigard, OR 97223
(503) 684-6105

J.P. Industrial Environmental
6901 SE Lake Road
Milwaukie, OR 97267
(503) 655-1810

Kenner, Inc.
34771 Government Road
Cottage Grove, OR 97424
(503) 942-0739

Keystone Contracting, Inc.
P.O. Box 921
Vancouver, WA 98668
(206) 574-9040

Lake Oswego Insulation
5845 SW McEwan Road
Lake Oswego, OR 97034
(503) 245-6460

Long Services Corporation
8025 10th Avenue S.
Seattle, WA
(206) 763-8433

LVI Environmental Services, Inc.
205 N. Page
Portland, OR 97227
(503) 287-7344

NAACO
1937 Republic Avenue
San Leandro, CA 94577
(415) 860-7043

Power Master, Inc.
115 V Street
Vancouver, WA 98661
(206) 694-6012 or (503) 257-8801

Riedel Environmental Services
P.O. Box 03096
Portland, OR 97203
(503) 286-4656

Roberts Environmental
1719 Irving
Eugene, OR 97402
(503) 688-4531

Spartan Insulation
7911 NE 33rd Drive, Suite 220
Portland, OR 97211
(503) 282-0175

Western Asbestos Abatement
6906 NE 40th, Suite B
Vancouver, WA 98661
(206) 693-1121 or (503) 775-6883

Willamette Insulation
1833 SE 7th
West Linn, OR 97068

W.L. Thomas, Inc
P.O. Box 8
2710 SE Grand Prairie Road
Albany, OR 97321
(503) 967-7245 or 928-5383

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